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THE ROSCOE MANUAL. VOLUME 2-1. SAMPLE CASE.(U)
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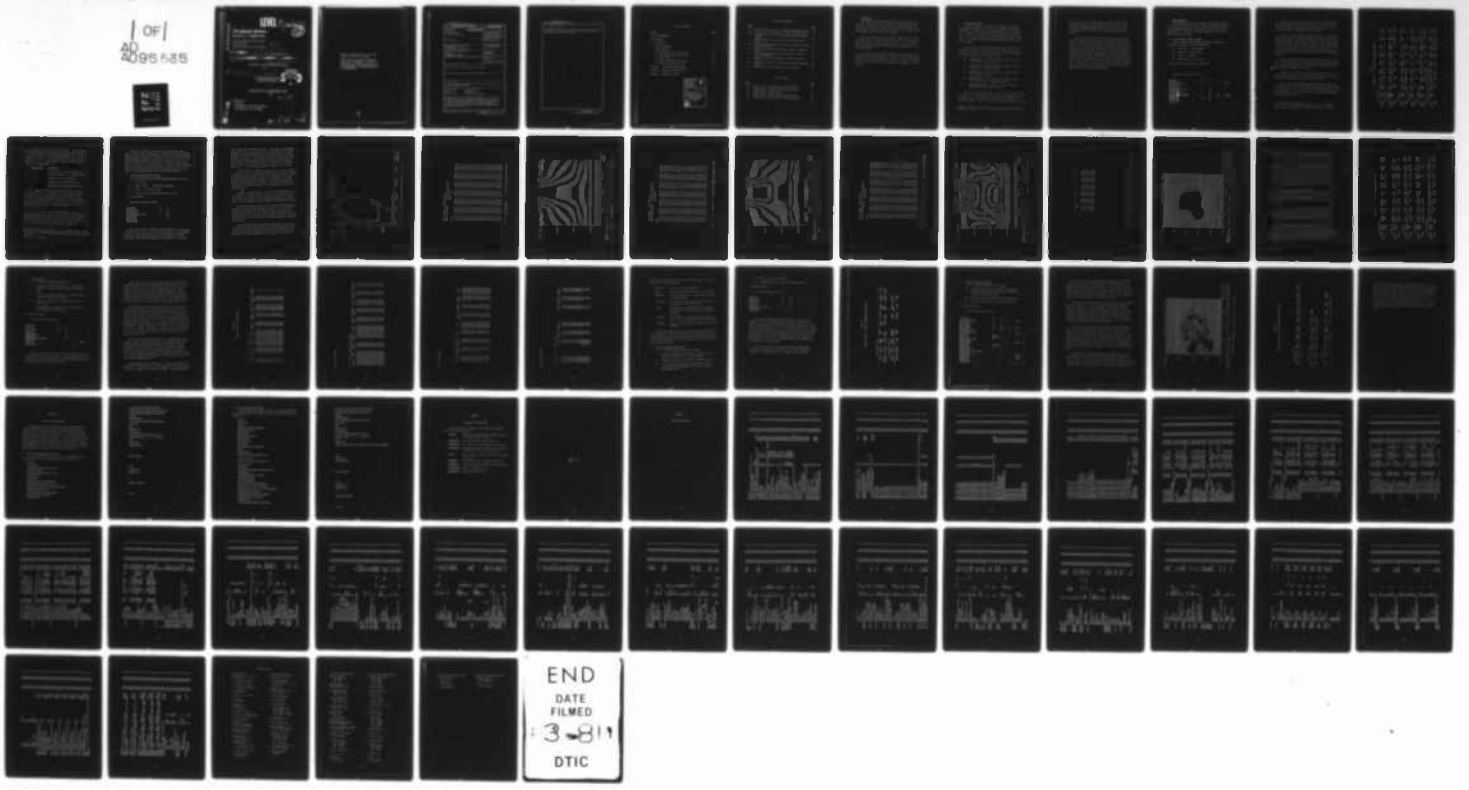

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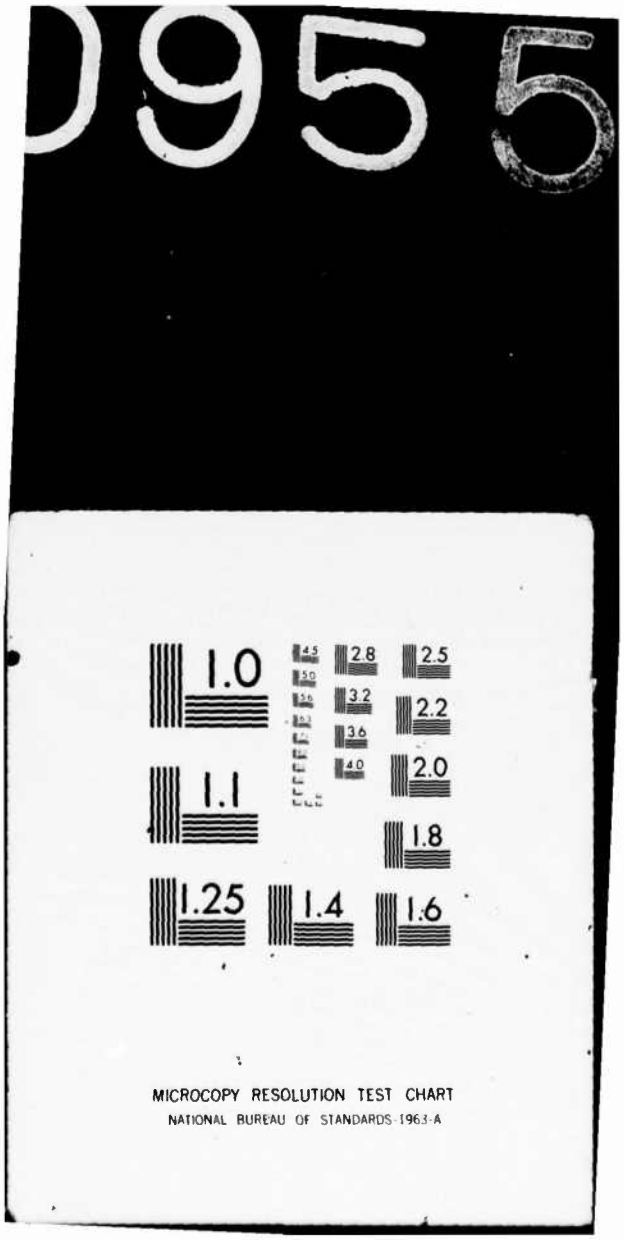
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Optical Sensors	Ballistic Missile Defense

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The ROSCOE computer code is designed specifically to be the "laboratory standard" for evaluating nuclear effects on radar and optical systems. The program provides a means for (1) evaluating sensor acquisition, discrimination, and tracking performance in a nuclear environment, (2) measuring various propagation error sources, and (3) computing specific phenomenological data.

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20. ABSTRACT (Continued)

This volume, Vol. 2-1, presents a description of sample problems utilizing the new ROSCOE data deck. Input and output options are discussed, and sample job control streams are provided.

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1 INTRODUCTION

This volume contains five ROSCOE sample cases, two environment runs (low- and high-altitude), and three system problems (radar, communication, and optics). For each example the inputs required to run the problem are described. These are followed by a small sample of the output tables and plots that the code produces.

The sample cases were generated using the sample data deck shown in Volume 1-1 with a few minor changes in each case. The structure of this input deck is briefly described in Section 2. Section 3 follows with a description of specific inputs and the resulting outputs for each sample problem.

Job control streams using the sample data deck are provided in Appendix A, and brief descriptions of permanent files used during ROSCOE execution are presented in Appendix B. Finally, a listing of the sample data deck is taken from Volume 1-1 and repeated in Appendix C for easy reference.

2 DATA DECK STRUCTURE

The sample data deck is stored as a permanent file (file name ROSCOEDATA) in UPDATE[1] library form (deck name DATA), and contains a sample setup for almost any type of ROSCOE problem the user wishes to run. To execute a particular problem, the user simply changes a few of the stored input variables via an UPDATE command (examples are shown below). A working knowledge of FLEXRED and DSA (described in Volume 1-1) is assumed.

The data deck, as currently structured, allows the user to run environment, radar surveillance and tracking, satellite communication, and optical surveillance and tracking problems. The input variables in the sample data deck are grouped as follows:

- General Inputs. Include event list, option flags, reference locations, output formats, etc.
- Radar Inputs. Variables required to simulate radar surveillance or tracking performance.
- Sat-Com Inputs. Variables required to simulate a satellite communication problem.
- Optics Inputs. Variables required to simulate optical sensor surveillance or tracking performance.
- Phenomenology Inputs. Variables required to simulate a burst and print environment outputs.

To run a specific problem, the user creates a set of changes to the data deck. The change package starts with a card to identify the deck to be charged (in this case DATA). The card should read *COMPILE DATA, starting in column 1. This card is followed by the change cards themselves.

---

[1] UPDATE is a Control Data Corporation program which provides a means for editing text files.

For each change, the user must prepare an UPDATE edit card (e.g., *D DATA.XXX deletes card number XXX from the deck) and the card(s) replacing the deleted statement (inserts can also be made). The replacement cards must conform to the FLEXRED format described in Volume 1-1.

The event list contained in the general input section is the single most important set of input data. This list drives the simulation. In the sample deck, eleven events have been inserted in the event list. Two of the events (the attack generation event which performs initialization functions, and the stop event which terminates program execution) are mandatory, while the other nine are optional. The optional events (radar, communications, optics, and burst events) have been given very large event times so that the program (which processes events in time order) will hit the stop event before executing them. To turn on any one of these events, the user should change the event time relative to the stop event time. The user can also add additional events as described in Volume 1-1.

3 SAMPLE PROBLEMS

This section describes sample problems which illustrate some of the available ROSCOE input and output options. As mentioned earlier, two environment problems (low- and high-altitude) and three system problems (radar surveillance, satellite communication, and optical surveillance) are presented.

3.1 LOW-ALTITUDE ENVIRONMENT PROBLEM

To run a simple low-altitude burst problem, consisting of a single burst and with the following assumptions:

- Burst time = 94.76 seconds
- Altitude = 8.8 kilometers
- Yield = 5 kilotons
- Output every 1 to 96 seconds

The user would input the following change deck:

[Cards read from bottom to top]

```
STOP TIME                          97.0    SEC
*I DATA.1194
GRID OUTPUT DATASET                1.0                      ZEROS
*D DATA.1185
DELTA PRINT TIME                   1.0     SEC
*D DATA.1181
ENVIRONMENT OUTPUT TIME            95.0    SEC
*D DATA.1178
        YIELD                      5.      KT
*D DATA.1074
        BURST POSITION             0.      0.      8.8      LOCXYZ
*D DATA.1005
BURST TIME                         94.76   SEC
*D DATA.1004
*COMPILE DATA
```

In this example the Burst Event Dataset-1 and Environment Output Event times have been changed relative to the Stop Event time so that they will be process d. The grid output dataset is "zeroed," since it is only appropriate for high-altitude bursts (>90 km).

The output for this example is shown in Table 3.1. There are six tabular output lists provided, including burst parameters; three sets of fireball parameters; a set of debris parameters; and a set which shows some point properties (electron density, reflection coefficient) within or near the fireball. For the burst parameters, a single line of output is provided for each burst. For the other outputs, separate lines of output are printed at the calculation times requested in the environment output event.

The Burst Parameter headings are self-explanatory, with the exception of the last two variables. These are used in the chemistry routine to flag the approximate time after burst when the fireball temperature drops to 3000°K and 2000°K, respectively.

Fireball Set-1 provides the fireball radii,[1] altitude, rise rate, expansion rate, density, temperature, and time since burst (or time since merge for merged bursts) at a series of calculation times.

Fireball Set-2 gives minimum and maximum altitudes at which the ellipsoidal fireball region is truncated, the orientation of the fireball axis in terms of the tilt from vertical and rotation CCW from east, the vortex radii,[2] the vortex volume, and a characteristic time to describe when merges have occurred.

---

[1]The fireball radial dimensions are defined in Fig. 2.8 of Volume 1.

[2]The vortex radial dimensions are defigned in Fig. 2.8 of Volume 1.

TABLE 3.1

EXAMPLE OUTPUT: LOW-ALTITUDE ENVIRONMENT PROBLEM

BURST PARAMETERS

TIME OF OUTPUT SEC	TOTAL ENERGY (ERGS)	FISSION ENERGY (ERGS)	BURST ALTITUDE KM	BURST PT. DENSITY (GM/CC)	SCALE HEIGHT KM	BURST PT. TEMP (DEG K)	INITIAL RADIUS KM	TIME TO REACH 3000K	TIME TO REACH 2000K
94.760	2.00784E+20	1.00392E+20	8.822	4.774SE-04	7.849	230.818	.057	11.049	19.979

FIREBALL SET-2

TIME OF OUTPUT SEC	FIREBALL INDEX NUMBER	MINIMUM ALTITUDE KM	MAXIMUM ALTITUDE KM	TILT FROM VERTICAL DEG	AXIS ROTATION DEG	HOR VORTEX RADIUS KM	VRT VORTEX RADIUS KM	VORTEX VOLUME (CM3)	CHARACT. TIME SEC
95.000	1	8.674	8.974	0.000	0.000	.195	.187	3.0728E+13	94.760
96.000	1	8.665	9.015	0.000	0.000	.246	.217	5.6096E+13	94.760

FIREBALL SET-3

TIME OF OUTPUT SEC	FIREBALL INDEX NUMBER	X-COORDINATE (CM)	Y-COORDINATE (CM)	Z-COORDINATE (CM)	OVAL OF CASSINI PARAMETER	OVAL ARM RADIUS KM	VORTEX TEMP (DEG-K)	FIREBALL KIND	MERGE ID INDEX
95.000	1	-1.1502E+08	-4.6359E+08	4.2357E+08	.051	0.000	448.560	1	0
96.000	1	-1.1502E+08	-4.6359E+08	4.2357E+08	.412	0.000	394.645	1	0

FIREBALL SET-1

TIME OF OUTPUT SEC	FIREBALL INDEX NUMBER	HORIZONTAL RADIUS KM	VERTICAL RADIUS KM	CENTER ALTITUDE KM	RISE RATE KM	EXPANSION RATE KM	FIREBALL DENSITY (GM/CC)	FIREBALL TEMP (DEG-K)	TIME SINCE BURST SEC
95.000	1	.122	.120	8.824	.008	.300	2.7071E-05	7015.752	.240
96.000	1	.158	.140	8.840	.040	.062	2.1217E-05	5303.715	1.240

DEBRIS PARAMETERS

TIME OF OUTPUT SEC	FIREBALL INDEX NUMBER	DEBRIS INDEX NUMBER	TOTAL ENERGY (ERGS)	DEBRIS ALTITUDE KM	HORIZONTAL RADIUS KM	VERTICAL RADIUS KM	DEBRIS DISTRIB. PARAMETER	EQUIVALENT SPH. RAD. KM	DEBRIS VOLUME (CM3)
95.000	1	1	1.00392E+20	8.826	.053	.053	8.000	.053	6.1427E+11
96.000	1	1	1.00392E+20	8.851	.086	.086	8.000	.086	3.3033E+12

DETAILED CHEMISTRY, REFLECTIVITY, AND ABSORPTION DATA

TIME OF OUTPUT SEC	FIREBALL INDEX NUMBER	ALTITUDE OF POINT KM	RANGE FROM FB CENTER KM	LOCATION OF POINT	ELECTRON DENSITY (CM-3)	TEMP AT POINT (DEG-K)	GRADIENT REGION WIDTH (CM)	REFLECTION COEFF. (NO ABS)	REFLECTION COEFF. (WITH ABS)
95.000	1	8.824	0.000	FIREBALL	3.9469E+15	7015.752	7321.352	1.0148-236	9.6665-237
96.000	1	8.840	0.000	FIREBALL	7.1747E+14	5303.715	1793.766	8.7311E-78	8.0-74E-90

Fireball Set-3 shows the fireball's earth-centered Cartesian coordinates, a shape parameter (oval of Cassini parameter) which describes the transition of the fireball from ellipsoid to a torus,[1] the oval arm radius,[2] the vortex boundary temperature, and two indices to provide merging information. The first index, "fireball kind," can have the following values:

Fireball Kind	Definition
1-2	Fireball prior to torus formation (above 100 km: 1 = spheroid, 2 = skewed spheroid)
3	Fireball after torus formation
4	Fireball has radiation-merged with new one
5	Fireball has hydromerged with another one

The second parameter, "merge ID index," describes where a merged fireball region has gone. For example, for radiation-merged fireballs (fireball kind = 4), the index number of the new merged fireball is given; for hydromerged fireballs (fireball kind = 5), two numbers are given (written consecutively to form the index), the first giving the index of the other fireball involved in the merge. and the second the new fireball index.

The table of Debris Parameters provides physical data for the debris region, including: total energy, altitude, radius, volume, and a "debris distribution parameter," which describes the distribution of fission debris as a function of the horizontal distance from the field line passing through the center of the region (see RANC IV).

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[1] When the Oval of Cassini parameter is 1.0, the fireball begins to look like a torus (a hole forms). The larger the parameter, the more toroidal the shape.

[2] See Fig. 2.8 of Volume 1.

Finally, at the bottom of the table the Detailed Point Data are shown. Electron density, temperature, the width of the steep temperature gradient region just outside the fireball, and the reflection coefficient with and without absorption are printed as a function of time. In this example, properties for only one point at the fireball center are computed at each time. The user can increase the number of points calculated inside and outside the fireball region by changing the appropriate parameters in the environment output event dataset (see Volume 1-1).

3.2 HIGH-ALTITUDE ENVIRONMENT PROBLEM

To run a high-altitude environment problem assuming the following,

- Burst time = 0
- Burst altitude = 200 kilometers (default)
- Yield = 1 megaton (default)
- Output every 30 seconds (default) from 0 to 180

the user would input:

[Cards read from bottom to top]

```
STOP TIME                          181.    SEC
*D DATA.1194
END PRINT TIME                     180.    SEC
*D DATA.1182
ENVIRONMENT OUTPUT TIME            0.      SEC
*D DATA.1178
BURST TIME                         0.      SEC
*D DATA.1004
*COMPILE DATA
```

When a high-altitude (>90 km) burst is simulated, the code produces a series of printer plots, as well as tabular outputs at items specified by the Environment Output Event input variables (DATA.1177 through DATA.1184). The Grid Output Dataset sets up these plots. The variable

"type" defines the location where the grid cut is made: type FIREBALL indicates that a cut through the center of the fireball will be made; otherwise, the second variable "index" is used to define the index of the cell in the X- or Y- or Z-direction to be used. the "kind of input desired" can be RHO for mass density plots, NE for electron density plots, STRI for striation fraction plots, TE for electron temperature plots, ALL for all of the above (default), or NONE for none of them.

In this example, the default values are used for the grid output, so printer plots for all the quantities mentioned are produced by taking a cut through the grid parallel to the Y-axis (normal to the field), through the fireball center. The grid size is defined in the Heave Coordinate Dataset (DATA.522 - DATA.540). The dataset values specify a 6×6 grid (36 columns) with each cell 0.02 radians on a side, and 17 vertical cells.

A sample of the grid output at 90. s after burst is shown in Figs. 3.1 through 3.9. The plots include a picture of the fireball and beta tube region, followed by tabular and graphic representations of mass density, electron density, electron temperature, and striation fraction.

The fireball plots are made in a plane aligned with the magnetic field to show the field line convergence and dip. The burst point is denoted by the symbol "+BP," the fireball region is denoted by the asterisks, and the beta tube by the dotted lines which emanate from the contained debris. The dashed lines in the figure represent altitudes of 60 and 85 km.

The next figure (Fig. 3.2) shows mass densities as a function of altitude and cell numbers within the grid. The mass densities in equal altitude increments are derived by interpolating the stored grid data. These data are then interpolated further to produce the contour plot

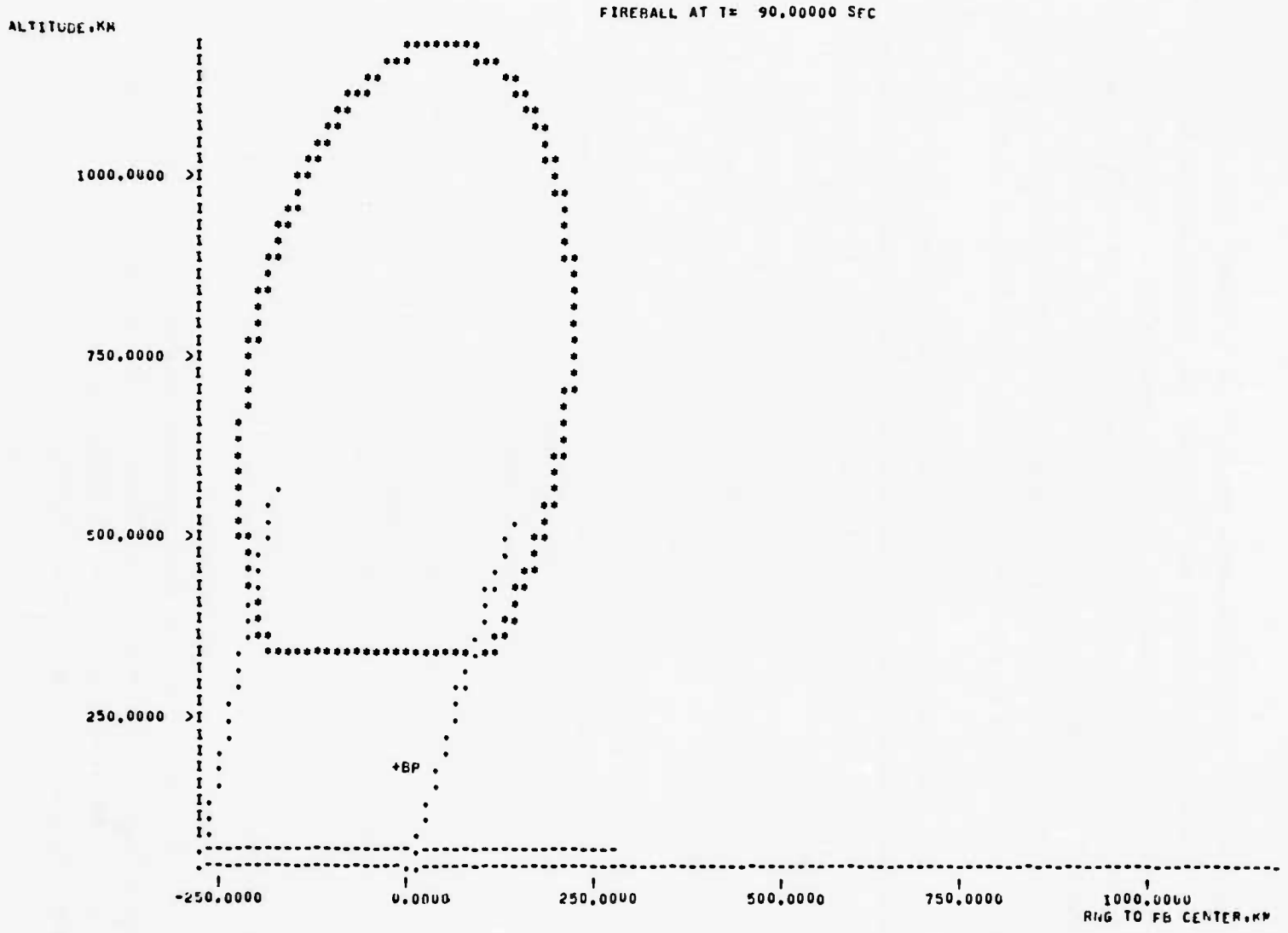

Figure 3.1. Fireball Shape at 90 seconds for Sample Environment Problem

TIME= 90.00000 X-CELL NUMBER= 3

MASS DENSITIES,GM/CC WITHIN THE ORIGINAL GRID

	Y-CELL NUMBER					
ALT,KM	1	2	3	4	5	6
797.00	.2217E-16	.2775E-16	.3216E-13	.3078E-13	.2769E-16	.2215E-16
759.79	.3593E-16	.4881E-16	.4191E-13	.4008E-13	.4866E-16	.3589E-16
722.58	.5861E-16	.9985E-16	.5447E-13	.5216E-13	.9918E-16	.5853E-16
685.37	.9913E-16	.2297E-15	.6721E-13	.6483E-13	.2271E-15	.9896E-16
648.16	.1677E-15	.6046E-15	.8289E-13	.7999E-13	.5922E-15	.1673E-15
610.95	.2948E-15	.1658E-14	.1022E-12	.9870E-13	.1622E-14	.2939E-15
573.74	.5311E-15	.3243E-14	.1262E-12	.1218E-12	.3166E-14	.5293E-15
536.53	.9535E-15	.5920E-14	.1560E-12	.1518E-12	.5815E-14	.9498E-15
499.32	.1652E-14	.9257E-14	.1930E-12	.1891E-12	.9104E-14	.1645E-14
462.11	.2864E-14	.1447E-13	.2387E-12	.2356E-12	.1425E-13	.2850E-14
424.89	.6735E-14	.2710E-13	.3495E-12	.3388E-12	.2663E-13	.6691E-14
387.68	.2484E-13	.5077E-13	.5364E-12	.5281E-12	.5010E-13	.2492E-13
350.47	.8042E-13	.1865E-12	.8798E-12	.8610E-12	.1842E-12	.8041E-13
313.26	.1665E-12	.8194E-12	.1704E-11	.1676E-11	.8056E-12	.1680E-12
276.05	.1173E-11	.1349E-11	.3561E-11	.3492E-11	.1342E-11	.1171E-11
238.84	.5042E-11	.4897E-11	.7356E-11	.7322E-11	.4875E-11	.5036E-11
201.63	.2689E-10	.2634E-10	.2010E-10	.2009E-10	.2635E-10	.2686E-10
164.42	.8017E-10	.7940E-10	.6918E-10	.6945E-10	.7941E-10	.8008E-10
127.21	.2062E-09	.2081E-09	.2025E-09	.2026E-09	.2081E-09	.2060E-09
90.00	.3565E-08	.3565E-08	.3565E-08	.3565E-08	.3565E-08	.3565E-08

Figure 3.2. Mass Densities at 90 seconds for Sample Environment Problem

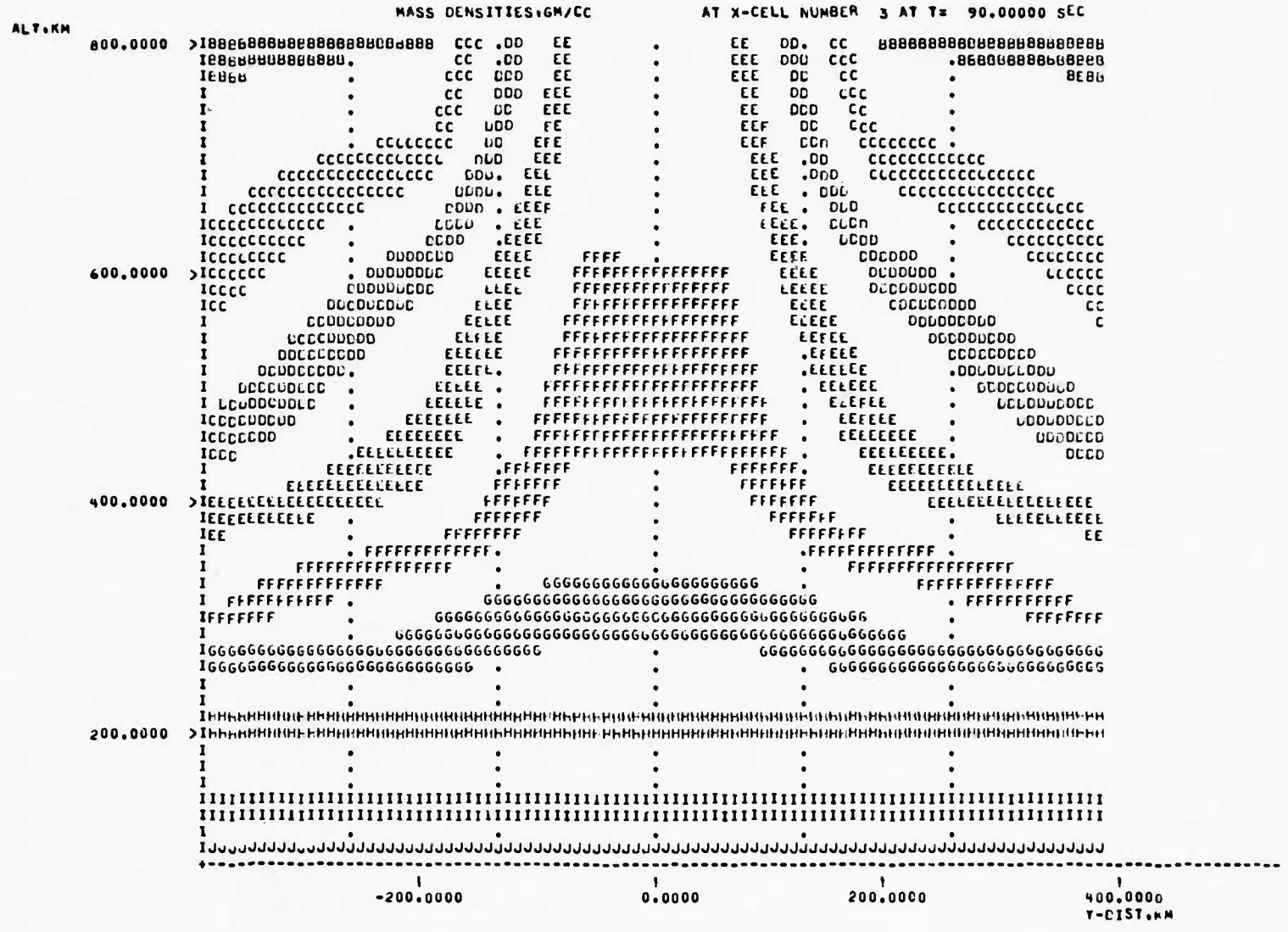

Figure 3.3. Mass Density Contours at 90 seconds for Sample Environment Problem

TIME= 90.00000 X-CELL NUMBER= 3

ELECTRON DENSITIES,CM-3 WITHIN THE ORIGINAL GRID

	Y-CELL NUMBER					
ALT,KM	1	2	3	4	5	6
797.00	.6771E+05	.8359E+05	.2598E+09	.2534E+09	.8341E+05	.6766E+05
759.79	.9357E+05	.1252E+06	.2898E+09	.2831E+09	.1248E+06	.9347E+05
722.58	.1297E+06	.2163E+06	.3236E+09	.3162E+09	.2149E+06	.1296E+06
685.37	.1836E+06	.4173E+06	.3684E+09	.3540E+09	.4128E+06	.1833E+06
648.16	.2598E+06	.1018E+07	.4193E+09	.3964E+09	.9942E+06	.2592E+06
610.95	.4007E+06	.2773E+07	.4773E+09	.4439E+09	.2689E+07	.3992E+06
573.74	.6524E+06	.6020E+07	.4208E+09	.4851E+09	.5833E+07	.6493E+06
536.53	.1063E+07	.1170E+08	.1242E+09	.1446E+09	.1145E+08	.1057E+07
499.32	.1751E+07	.1771E+08	.3649E+08	.4289E+08	.1734E+08	.1758E+07
462.11	.2863E+07	.2682E+08	.1072E+08	.1272E+08	.2627E+08	.2858E+07
424.89	.5924E+07	.2866E+08	.6907E+07	.7015E+07	.2838E+08	.5866E+07
387.68	.1687E+08	.3058E+08	.5537E+07	.5492E+07	.3025E+08	.1686E+08
350.47	.2068E+08	.1267E+08	.4344E+07	.4254E+07	.1288E+08	.2065E+08
313.26	.5765E+07	.3702E+07	.3223E+07	.3153E+07	.3668E+07	.5780E+07
276.05	.1504E+07	.3276E+06	.1073E+07	.1061E+07	.3282E+06	.1509E+07
238.84	.3248E+06	.1898E+06	.2045E+06	.2058E+06	.1896E+06	.3253E+06
201.63	.1222E+06	.1180E+06	.7184E+05	.7224E+05	.1180E+06	.1223E+06
164.42	.5240E+05	.5169E+05	.5123E+05	.5138E+05	.5169E+05	.5243E+05
127.21	.3140E+05	.3157E+05	.3307E+05	.3307E+05	.3156E+05	.3142E+05
90.00	.1353E+05	.1000E+03	.1353E+05	.1353E+05	.1000E+03	.1000E+03

Figure 3.4. Electron Densities at 90 seconds for Sample Environment Problem

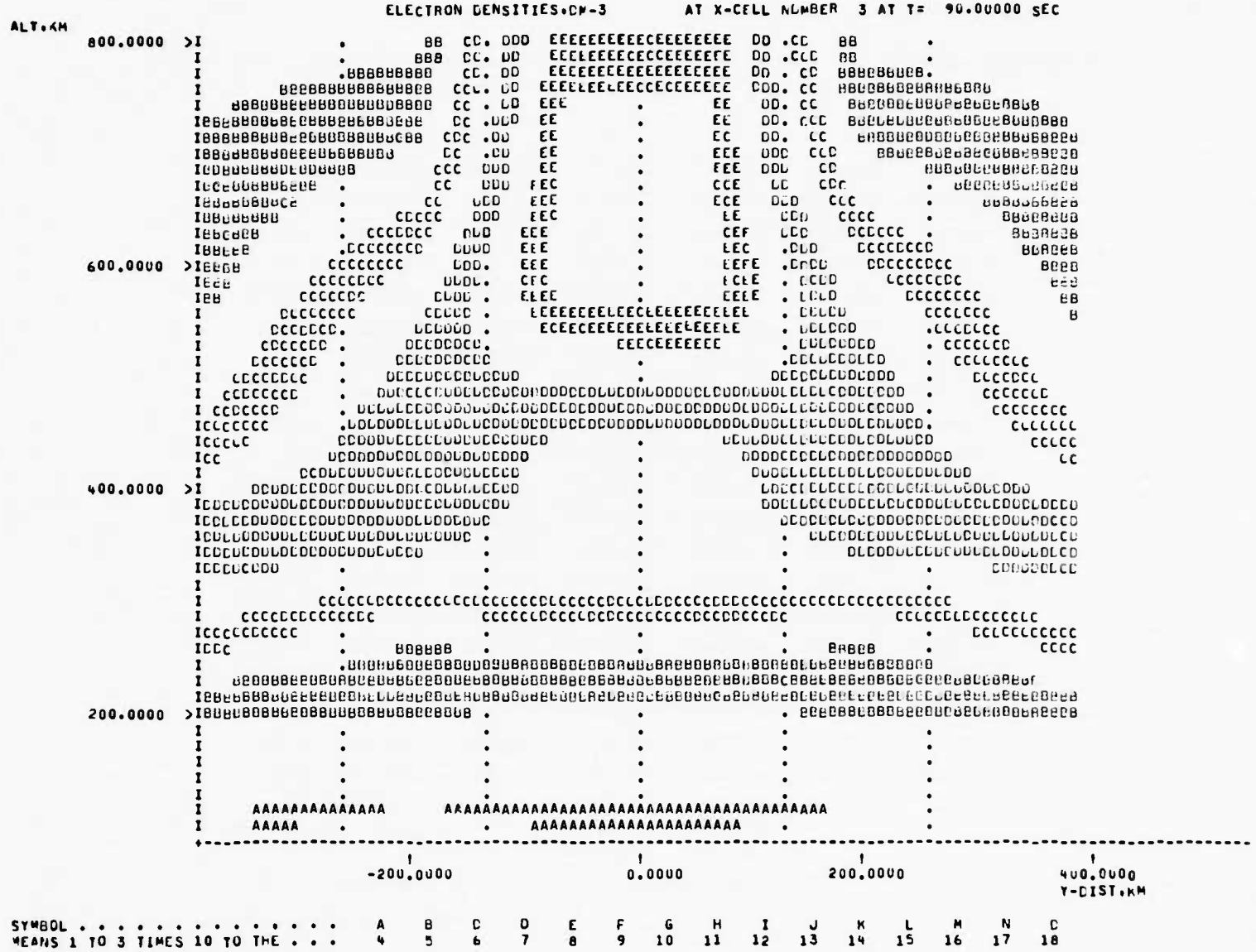

Figure 3.5. Electron Density Contours at 90 seconds for Sample Environment Problem

TIME= 90.00000 X-CELL NUMBER= 3

ELECTRON TEMPERATURES,DEG. K WITHIN THE CRIGINAL GRID

	Y-CELL NUMBER					
ALT.KM	1	2	3	4	5	6
797.00	.5001E+04	.4935E+04	.1180E+05	.1183E+05	.4935E+04	.5000E+04
759.79	.4613E+04	.4522E+04	.1124E+05	.1126E+05	.4522E+04	.4612E+04
722.58	.4246E+04	.4190E+04	.1065E+05	.1069E+05	.4190E+04	.4245E+04
685.37	.4000E+04	.3921E+04	.9601E+04	.9723E+04	.3922E+04	.3999E+04
648.16	.3753E+04	.4207E+04	.8547E+04	.8701E+04	.4187E+04	.3752E+04
610.95	.3573E+04	.4795E+04	.7493E+04	.7679E+04	.4759E+04	.3571E+04
573.74	.3434E+04	.5235E+04	.6535E+04	.6665E+04	.5196E+04	.3433E+04
536.53	.3314E+04	.5541E+04	.5986E+04	.6086E+04	.5516E+04	.3312E+04
499.32	.3377E+04	.5546E+04	.5436E+04	.5505E+04	.5528E+04	.3374E+04
462.11	.3440E+04	.5552E+04	.4885E+04	.4925E+04	.5541E+04	.3436E+04
424.89	.3687E+04	.5406E+04	.4340E+04	.4362E+04	.5404E+04	.3679E+04
387.68	.4204E+04	.5260E+04	.3790E+04	.3811E+04	.5262E+04	.4196E+04
350.47	.4263E+04	.5841E+04	.3333E+04	.3316E+04	.5841E+04	.4251E+04
313.26	.3481E+04	.4091E+04	.3060E+04	.3041E+04	.4103E+04	.3470E+04
276.05	.2441E+04	.2434E+04	.2252E+04	.2273E+04	.2440E+04	.2439E+04
238.84	.1547E+04	.1622E+04	.1612E+04	.1607E+04	.1626E+04	.1547E+04
201.63	.1005E+04	.1037E+04	.1225E+04	.1218E+04	.1037E+04	.1005E+04
164.42	.1000E+04	.1000E+04	.1000E+04	.1000E+04	.1000E+04	.9999E+03
127.21	.1000E+04	.1000E+04	.1000E+04	.1000E+04	.1000E+04	.9999E+03
90.00	.1026E+03	.1026E+03	.1026E+03	.1026E+03	.1026E+03	.1026E+03

Figure 3.6. Electron Temperatures at 90 seconds for Sample Environment Problem

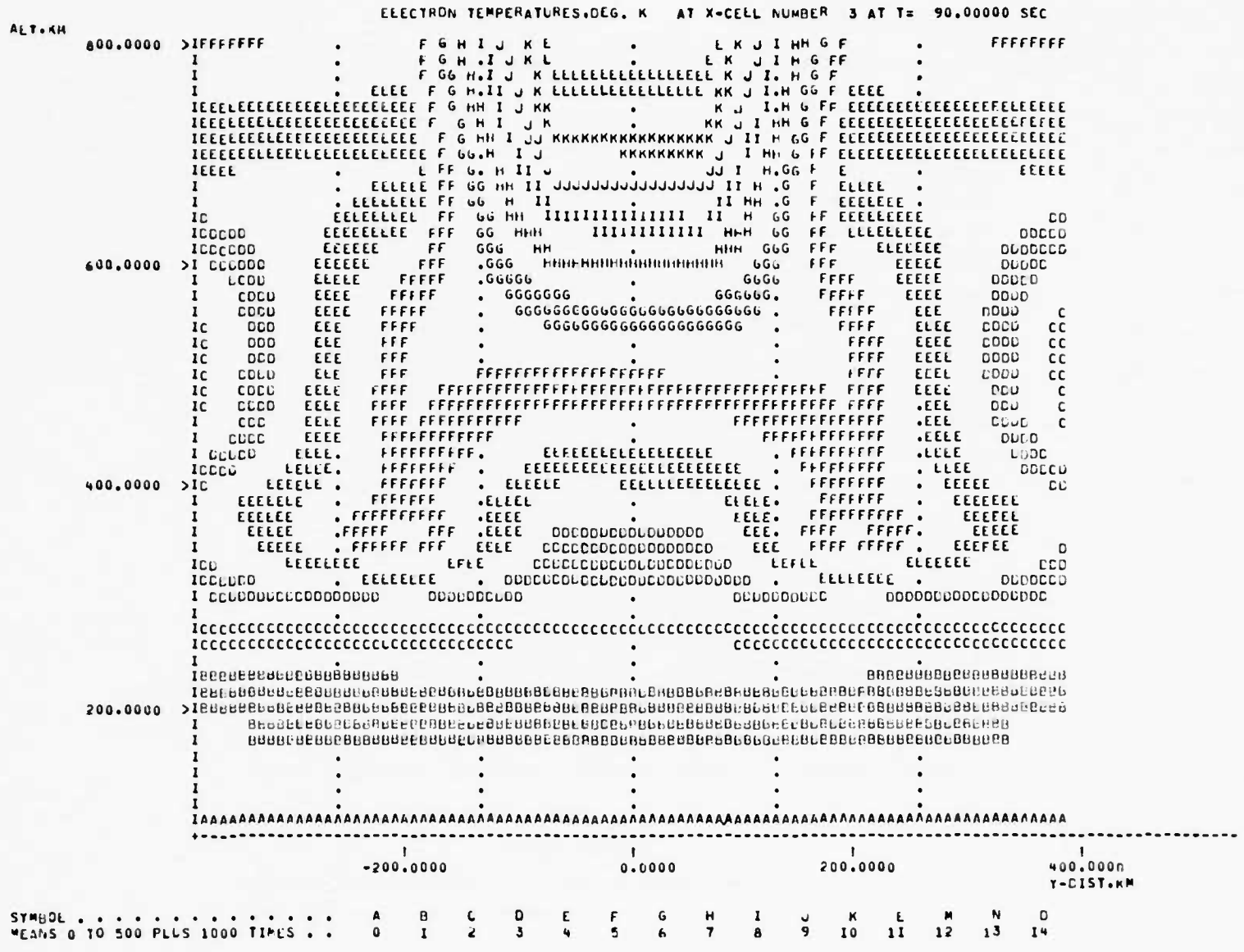

Figure 3.7. Electron Temperature Contours at 90 seconds for Sample Environment Problem

STRIATION FRACTION AT CELL CENTERS VS Z1,Z2 CELL NUMBER

Z2-CELL \ Z1-CELL	1	2	3	4	5	6
6	.001012	.001156	.001203	.001224	.001031	.001003
5	.001383	.001806	.001728	.001727	.001135	.001004
4	.001006	.001053	.002826	.002869	.001084	.001011
3	.001058	.003440	.002095	.002245	.001704	.001116
2	.001033	.001077	.001013	.001000	.001196	.001026
1	.001000	.001000	.001000	.001000	.001000	.001000

Figure 3.8. Striation Fraction at 90 seconds for Sample Environment Problem

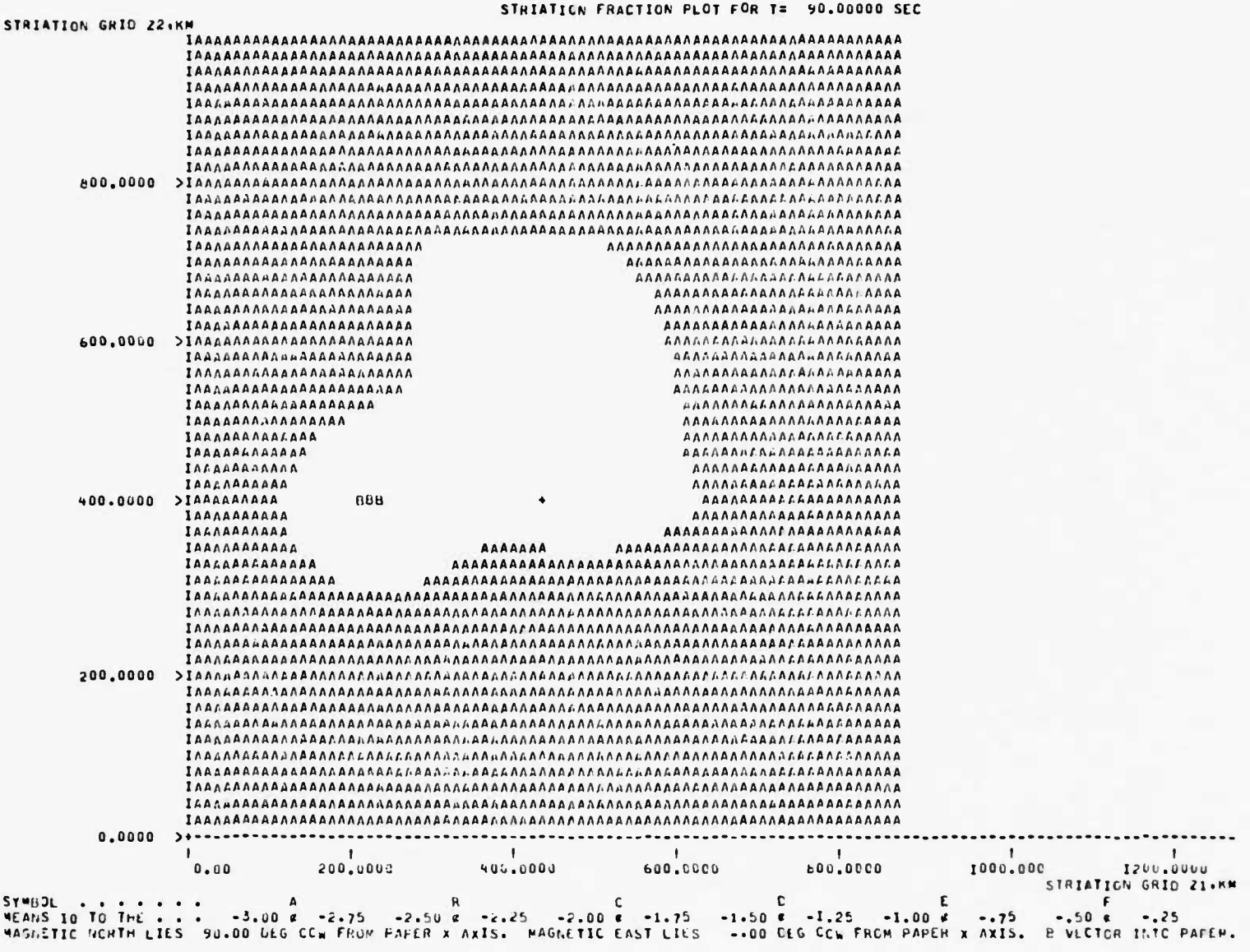

Figure 3.9. Striation Fraction Plot at 90 seconds for Sample Environment Problem

shown in Fig. 3.3. Note that at 90 seconds the air has begun to "heave" upward above the burst region. Similar tables and plots for electron density and electron temperature are shown in Figs. 3.4 through 3.7.

Tabular data and a contour plot of the striation function are shown in Figs. 3.8 and 3.9. Although the format is somewhat similar to the above output, these data are specified in a plane normal to the magnetic field, and the contour plot represents a view looking down the magnetic field from above. The axis of this magnetic grid plane may be rotated about the magnetic field direction, since it is oriented to maximize the information content used in the ion heave calculations which are used to produce the striation fractions. The rotation angle of this plane from magnetic north is printed at the bottom of the figure.

In addition to the above data, tabular outputs for burst parameters, fireball parameters, and beta tube parameters are produced when a high-altitude burst is simulated. These are shown in Table 3.2. Note that for high-altitude bursts, Fireball Set-4 (instead of Set-3) is printed out, and a list of Beta-Tube Parameters replaces the table of Debris Parameters.

Fireball Set-4 provides the earth-centered Cartesian coordinates of the fireball, the grid cell indices of the location of the bottom of the fireball, the position of this point from the cell bottom as a fraction of the cell dimension, and the "fireball kind" index as described in the low-altitude environment problem.

The Beta-Tube Parameters list shows the beta tube shape (straight, or kinked at 85-km altitude), the initial dip angle of the magnetic field at the burst point, the kink angle from horizontal of the beta tube above 85 km (if the tube is straight, this angle will be the same as the dip), the horizontal distance from a point directly below the burst point at 85 km to the center of the beta tube at 85 km, and the N-S and E-W radii of the tube at 85 km and 60 km.

TABLE 3.2

EXAMPLE OUTPUT: HIGH-ALTITUDE ENVIRONMENT PROBLEM

BURST PARAMETERS

TIME OF OUTPUT SEC	TOTAL ENERGY (ERGS)	FISSION ENERGY (ERGS)	BURST ALTITUDE KM	BURST PT. DENSITY (GM/CC)	SCALE HEIGHT KM	BURST PT. TEMP (DEG K)	INITIAL RADIUS KM	TIME TO REACH 3000K	TIME TO REACH 2000K
0.000	.4183E+23	.2091E+23	200.000	.3229E-12	51.082	12826.627	155.029	0.000	0.000

FIREBALL SET-1

TIME OF OUTPUT SEC	FIREBALL INDEX NUMBER	HORIZONTAL RADIUS KM	VERTICAL RADIUS KM	CENTER ALTITUDE KM	RISE RATE KM	EXPANSION RATE KM	FIREBALL DENSITY (GM/CC)	FIREBALL TEMP (DEG-K)	TIME SINCE BURST SEC
0.000	1	216.145	216.145	350.615	0.000	3.354	.7100E-11	5970.075	0.000
30.000	1	216.145	273.209	433.085	3.156	0.000	.1632E-12	4797.064	30.000

FIREBALL SET-2

TIME OF OUTPUT SEC	FIRLBALL INDEX NUMBER	MINIMUM ALTITUDE KM	MAXIMUM ALTITUDE KM	TILT FROM VERTICAL DEG	AXIS ROTATION DEG	HOR VORTEX RADIUS KM	VRT VORTEX RADIUS KM	VORTEX VOLUME (CM3)	CHARACT. TIME SEC
0.000	1	134.469	566.760	0.000	0.000	216.145	216.145	.4230E+23	0.000
30.000	1	183.886	706.163	2.899	0.000	216.145	273.209	.5347E+23	0.000

FIREBALL SET-4

TIME OF OUTPUT SEC	FIRLBALL INDEX NUMBER	X-COORDINATE (CM)	Y-COORDINATE (CM)	Z-COORDINATE (CM)	GRID CELL INDEX (X-DIR.)	GRID CELL INDEX (Y-DIR.)	GRID CELL INDEX (Z-DIR.)	FIRLBALL REL. POS. IN CELL	FIREBALL KIND
0.000	1	.8373E+08	-.4444E+09	.4979E+09	3	3	10	.306	1
30.000	1	.8476E+08	-.4499E+09	.5040E+09	3	3	10	.306	2

BETA TUBE PARAMETERS

TIME OF OUTPUT SEC	FIREBALL INDEX NUMBER	BETATUBE SHAPE	INITIAL DIP ANGLE DEG	KINK ANGLE FROM HORIZ DEG	KINK-BURST DISTANCE KM	N-S RADIUS AT 85KM KM	E-W RADIUS AT 85KM KM	N-S RADIUS AT 60KM KM	E-W RADIUS AT 60KM KM
0.000	1	KINK	76.306	76.306	28.022	111.227	109.249	110.532	108.826
30.000	1	KINK	76.306	81.797	28.467	149.190	150.431	148.259	149.849

3.3 RADAR PROBLEM

To run a radar surveillance problem, where:

- The radar is located in the center of a local three-dimensional coordinate system (defined in the sample deck)
- The radar is the type provided for in the sample deck and has a frame time of 10 seconds
- A burst, as specified in the sample deck, occurs at 1620 seconds
- The launch point, target point, and object parameters are as defined in the sample deck

the user would input:

[Cards read from bottom to top]

```
STOP TIME                          1700.    SEC
*D DATA.1194
BURST TIME                         1620.    SEC
*D DATA.1004
FRAME TIME                         10.      SEC
*D DATA.699
NUMBER ON TARGET                   1.       INT
*D DATA.506
NUMBER OF OBJECTS LAUNCHED         1.       INT
*D DATA.494
RADAR LIST                                                REFER
*D DATA.41
*COMPILE DATA
```

The event list in this case contains two events which will be processed before the stop event is reached: the attack generation event and a burst event. Radar surveillance events will be created internally when the object comes into the radar field of view.

Output tables of the object trajectory parameters, track measurement errors, tracking errors as output from the filter (only for a radar tracking problem), and two lists of propagation errors, and fireball position data relative to the radar. In this example, the tracking errors and fireball position data have not been generated. They can be enabled by changing the search flag (DATA.708) in the Search Mode Parameters Dataset from 1.0 to 0.0 and the flag "Do you want FB data relative to radar" (DATA.55) in the Basic Dataset from NO to YES, respectively.

The radar problem output list is shown in Table 3.3. It begins with the Trajectory Output for the object-and-radar pair specified in the sample deck. This list gives the actual object trajectory (altitude, range, azimuth, elevation, and velocity) data at each radar look time, plus the signal-to-noise ratio and the number of images seen by the radar. The event type is displayed in column 1. While only "SEARCH" pulses have been generated in this example, in a track simulation the event type would show "SEARCH," "VERIFY," "TRACK IN," and "TRACK" as track is initiated on the object. In column 9, the number of targets can be zero if the target is lost, one if a single target has been located, or more than one if multipath effects occur.

The Trajectory Output is followed by the Track Measurement, which contains a list of the radar-measured target coordinates and pulse-by-pulse measurement errors in each coordinate. The predicted position (colums 2-4) is either equivalent to the actual position for search pulses (as in this case), or is the position predicted by the track filter once track has been initialized. The measured coordinates (columns 5-7) are those generated during the current look, and include all refraction and radar measurement errors.

The Propagation Output is shown next. Included in this table are measures of the absorption, noise, clutter, dispersion, and Faraday rotation losses as computed along each line of sight. A Hollerith message is

TABLE 3.3

EXAMPLE OUTPUT: RADAR PROBLEM

RADAR LAUNCH 1 TRAJECTORY OUTPUT

TYPE OF EVENT	TIME OF OUTPUT SEC	POSITION ALTITUDE M	DATA FOR RANGE M	OBJECT AT AZIMUTH DEG	SPECIFIED ELEVATION DEG	TIME------ VELOCITY M	---------- SIGNAL TO NOISE (DB)	NUMBER OF TARGETS
SEARCH	1465.999	945026.461	3304651.765	85.660	2.681	6124.174	24.253	1
SEARCH	1475.999	931289.151	3250511.198	85.647	3.009	6130.263	24.681	1
SEARCH	1485.999	918690.240	3191907.782	85.585	3.338	6154.679	25.189	1
SEARCH	1495.999	905847.706	3133040.481	85.504	3.666	6170.423	25.713	1
SEARCH	1505.999	892743.784	3073907.868	85.472	3.995	6186.495	26.205	1
SEARCH	1515.999	877384.060	3014508.594	85.401	4.325	6202.898	26.677	1
SEARCH	1525.999	865760.756	2954841.304	85.409	4.655	6219.631	27.117	1
SEARCH	1535.999	851497.758	2894764.629	85.378	4.985	6236.697	27.550	1
SEARCH	1545.999	837771.063	2834097.194	85.348	5.315	6254.096	27.932	1
SEARCH	1555.999	823380.904	2774217.612	85.317	5.646	6271.830	28.340	1
SEARCH	1565.999	808750.646	2713184.487	85.287	5.978	6289.900	28.687	1
SEARCH	1575.999	793950.941	2652436.415	85.257	6.310	6308.307	29.009	1
SEARCH	1585.999	778707.600	2591131.983	85.227	6.642	6327.053	29.349	1
SEARCH	1595.999	763302.683	2529549.766	85.197	6.975	6346.139	29.638	1
SEARCH	1605.999	747642.000	2467688.335	85.168	7.308	6365.567	29.895	1
SEARCH	1615.999	731725.858	2405546.249	85.139	7.642	6385.337	30.169	1
SEARCH	1625.999	715554.135	2343122.054	85.110	7.976	6405.452	29.964	1
SEARCH	1635.999	699126.475	2280414.310	85.081	8.311	6425.912	30.988	1
SEARCH	1645.999	682444.414	2217421.538	85.052	8.646	6446.721	31.559	1
SEARCH	1655.999	665500.559	2154142.271	85.024	8.982	6467.879	32.344	1
SEARCH	1665.999	648313.400	2090575.031	84.996	9.318	6489.387	33.035	1
SEARCH	1675.999	630865.166	2026718.194	84.968	9.655	6511.249	33.735	1
SEARCH	1685.999	613161.816	1962570.539	84.940	9.993	6533.464	34.382	1
SEARCH	1695.999	595203.653	1898130.434	84.913	10.331	6556.036	34.754	1

Table 3.3 (continued)

RADAR LAUNCH 1 TRACK MEASUREMENT ERRORS

TIME OF OUTPUT SEC	PREDICTED RANGE M	PREDICTED AZIMUTH DEG	PREDICTED ELEVATION DEG	MEASURED RANGE M	MEASURED AZIMUTH DEG	MEASURED ELEVATION DEG	RANDOM ERRORS--IN RANGE M	RANDOM ERRORS--IN AZIMUTH DEG	RANDOM ERRORS--IN ELEVATION DEG
1465.999	330885[illegible].785	85.680	2.681	330[illegible].015	85.557	2.565	-50.772	0.000	0.000
1475.999	325051[illegible].108	85.567	3.009	325[illegible].047	85.769	3.146	189.960	0.000	0.000
1485.999	319[illegible]907.782	85.535	3.338	319[illegible].405	85.673	3.020	-13.377	0.000	0.000
1495.999	313304[illegible].481	85.504	3.666	313[illegible].506	85.685	3.538	-48.975	0.000	0.000
1505.999	307[illegible]97.868	85.472	3.995	307[illegible].605	85.555	3.445	22.737	0.000	0.000
1515.999	301[illegible]50.594	85.441	4.325	301[illegible].746	85.231	4.349	172.172	0.000	0.000
1525.999	295[illegible]41.304	85.409	4.655	295[illegible].137	85.639	4.541	-130.177	0.000	0.000
1535.999	289[illegible]0.629	85.378	4.985	289[illegible].814	85.233	4.764	-21.015	0.000	0.000
1545.999	283[illegible]7.194	85.346	5.315	283[illegible].679	85.177	5.000	-169.515	0.000	0.000
1555.999	277[illegible]17.012	85.315	5.646	277[illegible].073	85.617	5.821	-91.538	0.000	0.000
1565.999	271[illegible]64.487	85.283	5.978	271[illegible].679	85.186	6.000	-118.846	0.000	0.000
1575.999	265[illegible]36.415	85.252	6.310	265[illegible].605	85.176	6.000	152.229	0.000	0.000
1585.999	259[illegible]31.903	85.220	6.642	259[illegible].782	85.518	6.730	54.760	0.000	0.000
1595.999	25295[illegible].766	85.187	6.975	252[illegible].400	85.176	7.043	-40.301	0.000	0.000
1605.999	246[illegible]8.335	85.156	7.308	246[illegible].474	85.143	7.081	10.159	0.000	0.000
1615.999	240[illegible].249	85.124	7.642	240[illegible].205	85.366	7.901	-177.454	0.000	0.000
1625.999	234[illegible].059	85.093	7.976	234[illegible].933	85.459	7.889	54.357	0.000	0.000
1635.999	228[illegible].510	85.061	8.311	228[illegible].389	85.124	8.186	-74.116	0.000	0.000
1645.999	2217[illegible].536	85.032	8.648	2217[illegible].605	85.059	8.663	143.759	0.000	0.000
1655.999	215[illegible].271	85.000	8.982	215[illegible].139	85.162	9.020	49.510	0.000	0.000
1665.999	209[illegible].051	84.969	9.318	209[illegible].139	84.771	9.275	-191.564	0.000	0.000
1675.999	202[illegible].194	84.938	9.655	202[illegible].207	85.057	9.962	52.256	0.000	0.000
1685.999	196[illegible].539	84.908	9.993	196[illegible].405	84.871	10.175	234.550	0.000	0.000
1695.999	189[illegible].454	84.877	10.331	189[illegible].774	84.912	10.333	-144.016	0.000	0.000

Table 3.3 (continued)

RADAR LAUNCH 1 PROPAGATION OUTPUT

TIME OF OUTPUT SEC	ABSORPTION FROM ALL SOURCES	THRESHOLD ABSORPTION	NOISE TEMP.	NOISE POWER	CLUTTER-TO-NOISE RATIO (DB)	DISPERSIVE LOSS	FARADAY ROTATION LOSS	FAILURE MODE
1465.999	0.000	7.564	0.000	.2UA5E-09	0.000	1.000	1.000	NO FAILURE
1475.999	0.000	7.738	0.000	.2UA5E-09	0.000	1.000	1.000	NO FAILURE
1485.999	0.000	7.882	0.000	.2UA5E-09	0.000	1.000	1.000	NO FAILURE
1495.999	0.000	8.009	0.000	.2UA5E-09	0.000	1.000	1.000	NO FAILURE
1505.999	0.000	8.125	0.000	.2UA5E-09	0.000	1.000	1.000	NO FAILURE
1515.999	0.000	8.240	0.000	.2UA5E-09	0.000	1.000	1.000	NO FAILURE
1525.999	0.000	8.366	0.000	.2UA5E-09	0.000	1.000	1.000	NO FAILURE
1535.999	0.000	8.778	0.000	.2UA5E-09	0.000	1.000	1.000	NO FAILURE
1545.999	0.000	8.970	0.000	.2UA5E-09	0.000	1.000	1.000	NO FAILURE
1555.999	0.000	9.179	0.000	.2UA5E-09	0.000	1.000	1.000	NO FAILURE
1565.999	0.000	9.394	0.000	.2UA5E-09	0.000	1.000	1.000	NO FAILURE
1575.999	0.000	9.572	0.000	.2UA5E-09	0.000	1.000	1.000	NO FAILURE
1585.999	0.000	9.705	0.000	.2UA5E-09	0.000	1.000	1.000	NO FAILURE
1595.999	0.000	10.010	0.000	.2UA5E-09	0.000	1.000	1.000	NO FAILURE
1605.999	0.000	10.636	0.000	.2UA5E-09	0.000	1.000	1.000	NO FAILURE
1615.999	0.000	10.948	0.000	.2UA5E-09	0.000	1.000	1.000	NO FAILURE
1625.999	.304	10.967	0.000	.2UA5E-09	0.000	1.000	1.000	NO FAILURE
1635.999	.143	10.997	0.000	.2UA5E-09	0.000	1.000	1.000	NO FAILURE
1645.999	.205	11.101	0.000	.2UA5E-09	0.000	1.000	1.000	NO FAILURE
1655.999	.148	11.951	0.000	.2UA5E-09	0.000	1.000	1.000	NO FAILURE
1665.999	.125	11.714	0.000	.2UA5E-09	0.000	1.000	1.000	NO FAILURE
1675.999	.100	11.909	0.000	.2UA5E-09	0.000	1.000	1.000	NO FAILURE
1685.999	.084	12.083	0.000	.2UA5E-09	0.000	1.000	1.000	NO FAILURE
1695.999	.197	12.596	0.000	.2UA5E-09	0.000	1.000	1.000	NO FAILURE

Table 3.3 (concluded)

[illegible] LAUNCH 1 PROPAGATION OUTPUT

TIME OF OUTPUT SEC	BIAS RANGE M	BIAS REFRACTION AZIMUTH DEG	BIAS ERRORS ELEVATION DEG	RANDOM RANGE M	RANDOM REFRACTION AZIMUTH DEG	RANDOM ERRORS ELEVATION DEG
1485.999	0.000	0.000	0.000	0.000	0.000	0.000
1495.999	0.000	0.000	0.000	0.000	0.000	0.000
1505.999	0.000	0.000	0.000	0.000	0.000	0.000
1515.999	0.000	0.000	0.000	0.000	0.000	0.000
1525.999	0.000	0.000	0.000	0.000	0.000	0.000
1535.999	0.000	0.000	0.000	0.000	0.000	0.000
1545.999	0.000	0.000	0.000	0.000	0.000	0.000
1555.999	0.000	0.000	0.000	0.000	0.000	0.000
1565.999	0.000	0.000	0.000	0.000	0.000	0.000
1575.999	0.000	0.000	0.000	0.000	0.000	0.000
1585.999	0.000	0.000	0.000	0.000	0.000	0.000
1595.999	0.000	0.000	0.000	0.000	0.000	0.000
1605.999	0.000	0.000	0.000	0.000	0.000	0.000
1615.999	0.000	0.000	0.000	0.000	0.000	0.000
1625.999	130.517	.000	.018	.000	.000	.000
1635.999	130.166	.000	.018	.000	.000	.000
1645.999	128.346	.000	.016	.000	.000	.000
1655.999	126.548	.000	.015	.000	.000	.000
1665.999	124.691	.000	.019	.000	.000	.000
1675.999	120.887	.000	.023	.000	.000	.000
1685.999	116.006	.000	.021	.000	.000	.000
1695.999	116.566	.000	.030	.000	.000	.000

also printed to describe the quality of each received pulse. This flag can have the following messages:

NO FAILURE	S/N received is above threshold.
RANGE	The radar is range(power)-limited for this target.
ABSORPTION	The absorption due to all sources has reduced the S/N below threshold.
ABS + NOISE	The combination of absorption and fireball noise has reduced the S/N below threshold.
TOTAL	The combination of absorption, noise, dispersion, and Faraday rotation has dropped the S/N below threshold.
LOW SIGNAL	The combination of the above effects and refraction or clutter has dropped the S/N below threshold.
NO TARGET	There are no targets within the range gate and 3 dB beamwidth.

The second propagation table gives refraction errors for both bias and random errors. The bias errors are due to the bending of radar beam due to smooth gradients in electron density, while the random errors are produced when striations in the electron density field occur (since these are treated statistically).

3.4 SATELLITE COMMUNICATIONS PROBLEM

To run a satellite communications problem, where:

- The ground transmitter and receiver are co-located directly beneath the satellite (as in the sample problem.
- Communication links are as defined in the sample data deck.
- A nuclear burst with the sample deck yield and altitude centered along the transmitter-receiver line of sight (as in the sample deck).

- Burst occurs at zero seconds.
- Communications events occur at 100 and 200 seconds.

the user would input:

[Cards read from bottom to top]

```
STOP TIME                          201.    SEC
*D DATA.1194
BURST TIME                         0.      SEC
*D DATA.1004
TIME STEP                          100.    SEC
*D DATA.767
COMMUNICATIONS EVENT TIME          100.    SEC
*D DATA.763
*COMPILE DATA
```

The Satellite-Communication output consists of propagation and probability of bit error data and satellite position coordinates with respect to the ground sensor (transmitter and receiver) positions. These output lists are shown in Table 3.4. In the first output list, the uplink and downlink loss factors are the losses due to absorption from all sources (dimensionless) and the uplink and downlink scintillation values refer to the standard deviation in phase in radians due to scintillation effects. The probability of bit error on the uplink, downlink, and combined path are shown in the last three columns.

The second output list shows the range, azimuth, and elevation coordinates of the satellite with respect to the ground transmitter (columns 2-4) and the ground receiver (columns 5-7), respectively.

TABLE 3.4

EXAMPLE OUTPUT: SATELLITE COMMUNICATIONS PROBLEM

COMMUNICATIONS OUTPUT -1

TYPE OF OUTPUT	TIME OF OUTPUT SEC	UPLINK LOSS FACTOR	UPLINK SCINT	DOWNLINK LOSS FACTOR	DOWNLINK SCINT	PROB. OF ERROR SATELLITE	PROB. OF ERROR GROUND	PROB. OF ERROR
COM-RECEVD	100.000	1.048	10893.	1.067	13230.	.39898	.50726E-04	.39899
COM-RECEVD	200.000	1.011	1880.0	1.013	2166.8	.40437	.37777E-04	.40438

COMMUNICATIONS OUTPUT -2

TIME OF OUTPUT SEC	RANGE S-FROM-T KM	AZIMUTH S-FROM-T DEG	ELEVATION S-FROM-T DEG	RANGE S-FROM-R KM	AZIMUTH S-FROM-R DEG	ELEVATION S-FROM-R DEG
100.000	35787.000	-.000	89.998	35787.000	-.000	89.998
200.000	35787.000	-.000	89.998	35787.000	-.000	89.998

3.5 OPTICAL SURVEILLANCE PROBLEM

To run an optical surveillance problem, where:

- The sensor is located on a satellite at synchronous altitude (default) and is pointed at a reference location near a low-altitude burst.
- The sensor type is as provided for in the sample deck.
- The sensor event occurs at 10 seconds after burst.

the user would input:

[Cards read from bottom to top]

```
STOP TIME                          11.0      SEC
*D DATA.1194
GRID OUTPUT DATASET                1.0                          ZEROS
*D DATA.1185
BURST YIELD                        100.      KT
*D DATA.1034
BURST POSITION                     70.       -79.33    47.75    GEOGR
BURST TIME                         0.        SEC
*D DATA.1004..1005
SPIRE COMPUTATION LIST                                          REFER
*D DATA.946
SCAN TYPE                          LINEAR
MODEL TYPE                         GENERAL
SIMULATE OPTICS TIME               10.       SEC
*D DATA.942..944
OPTICS OPTIONS                                                  REFER
*D DATA.885
OPTICS TYPE                        SURVEILNCE
*D DATA.878
OPTICS LOOK TIME                   10.       SEC
*D DATA.846
REF POS FOR POINTING SENSOR
*D DATA.576
OPTICAL SENSOR LIST                                             REFER
*D DATA.58
OBJECT LIST                                                     REFER
*D DATA.40
*COMPILE DATA
```

Output for the optical sensor surveillance problem described above consists of printer plots and tabular lists. If desired, the user can generate printer plots of relative radiance at the focal plane for each object and/or a composite plot of all objects. As an example, Fig. 3.10 depicts a composite contour plot of relative radiance in the sensor focal plane for the example problem described above. The plot shows a fireball region and beta tube region at ten seconds after burst.

The output lists created for the optical sensor surveillance problem are shown in Table 3.5. An Optical Measurements dataset is produced whenever a simulated optics event (DATA.940) is specified (DATA.937). Measurement data will be computed and output whenever the optics calculation type (DATA.879) is designated as "POINTS"; otherwise only zeros will appear in the measurement columns as shown in the example. The actual, measured, and estimated coordinates referred to in the list are measured in angular units relative to the sensor boresight.

The next output list shows Integrated Path Data for each path in the field of view that is simulated. The path is identified by the azimuth and elevation off-boresight (columns 3 and 4). Column 5 is the radiance along the path due to all emission and scattering sources. The integrated radiance in column 6 is just the radiance integrated over all band intervals (the sum of the values shown in column 5 for each band interval), and the sigma due to structure (column 7) is the deviation in the integrated radiance due to striated (or structured) regions along the path.

The last tabular output is produced when a simulated optics event is specified, and the optics calculation type (DATA.879) is designated as "FOV" or "LOCAL," so that a scan of the field of view is produced. The optical samples represent the output at the detector(s) as the sensor scans along the field of view. Thus, separate rows of output are produced as a

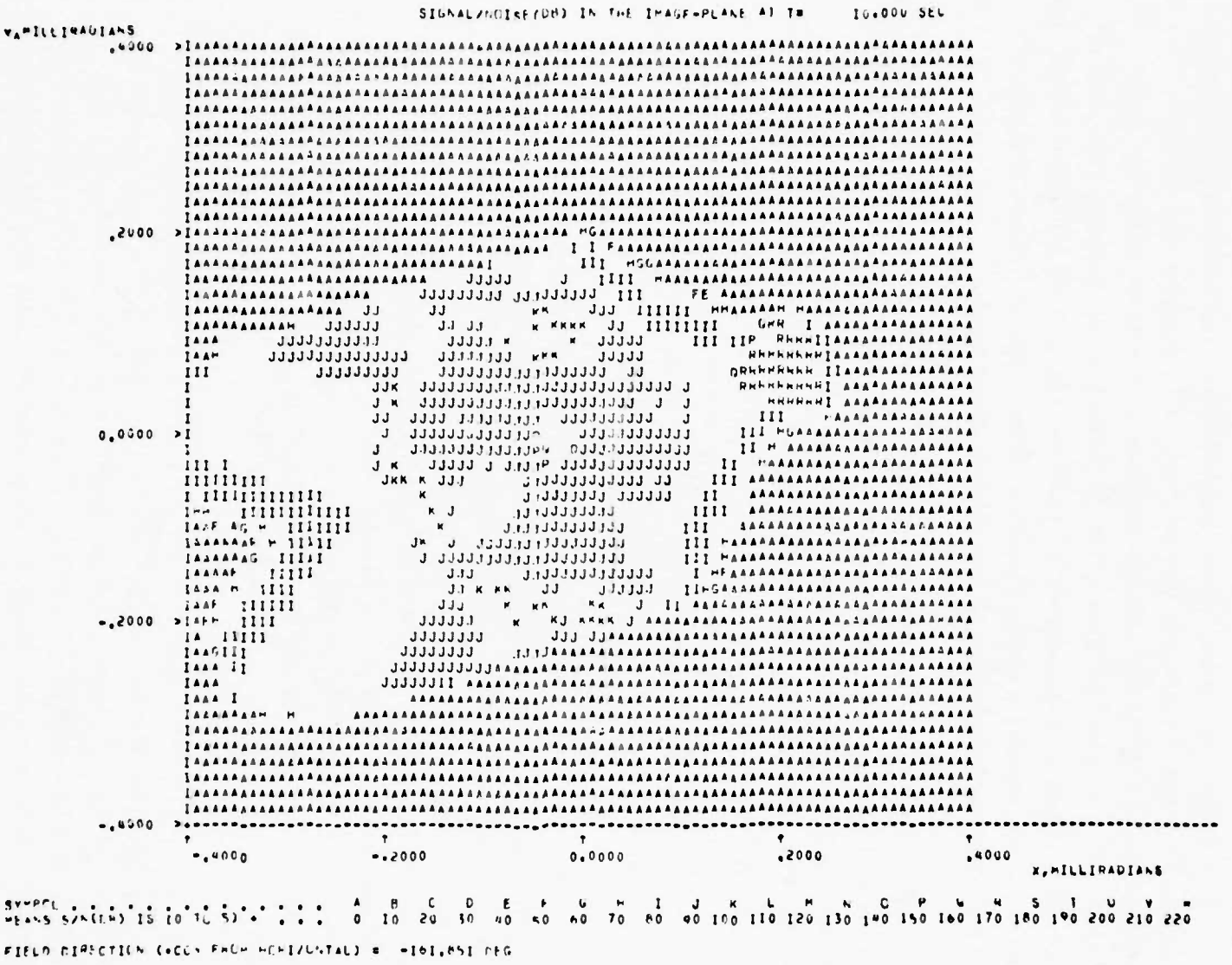

Figure 3.10. Signal/Noise in the Image Plane at T = 10 Seconds

TABLE 3.5

EXAMPLE OUTPUT: OPTICAL SENSOR SURVEILLANCE PATTERN

OPTICAL MEASUREMENTS

TIME OUTPUT SEC	CENTRAL WAVELENGTH M	ACTUAL AZIMUTH (RADIANS)	--COORDS ELEVATION (RADIANS)	MEASURED AZIMUTH (RADIANS)	--COORDS ELEVATION (RADIANS)	ESTIMATED AZIMUTH (RADIANS)	--COORDS ELEVATION (RADIANS)	IRRADIANCE AT SENSOR (W/CM2)	SIGNAL-TO-NOISE (DB)
10.000	.255OE-05	0.	0.	0.	0.	0.	0.	0.	0.

INTEGRATED PATH DATA

TIME OF OUTPUT SEC	CENTRAL WAVELENGTH M	AZIMUTH OFF-AXIS (RADIANS)	ELEVATION OFF-AXIS (RADIANS)	RADIANCE (PHOTONS/ S-SR-CM2)	INTEGRATED RADIANCE	SIGMA DUE TO STRCTR
10.000	.255OE-05	-.2000E-03	-.2000E-03	.3667E+12	.3667E+12	0.
10.000	.255OE-05	-.2000E-03	.2000E-03	.3663E+12	.3663E+12	0.

OPTICAL SAMPLES

TIME OF OUTPUT SEC	DETECTOR NUMBER	CENTRAL WAVELENGTH M	AZIMUTH OFF-AXIS (RADIANS)	ELEVATION OFF-AXIS (RADIANS)	SCANNED SIGNAL OUTPUT	NORMALIZED SIGNAL OUTPUT	FINAL SIGNAL OUTPUT	TARGET DETECTION FLAG
1.000200	1.000	.255OE-05	-.4000E-03	0.	.5424E-08	.2000E-01	-.4000E-02	BKGRND
1.000015	1.000	.255OE-05	-.3965E-03	0.	.2670E-07	.1000	-.3001E-01	BKGRND

function of time, detector number, and the central wavelength of the band. The position of the detector relative to the center of the field of view is shown in azimuth and elevation coordinates in columns 4 and 5. The last four columns show: (1) the scanned signal output (irradiance at the detector), (2) the normalized signal output (the irradiance normalized to the sensor NEFD), (3) the final signal output (after all other processing such as differencing has been completed), and (4) the target detection flag which signifies whether the final signal exceeds a pre-set threshold designating the point a "TARGET" versus a "BKGND" point.

APPENDIX A

SAMPLE JOB CONTROL STREAMS

The ROSCOE program is most easily used by attaching the program in its binary form and making the appropriate changes to the data deck. However, at times it is useful to make changes to the ROSCOE subroutines or ROSCOE overlay structure before execution. The new data deck can be utilized in either of these execution modes. This section describes sample job control streams for executing ROSCOE in its binary form and also for making changes to the ROSCOE subroutines or overlay structure. Familiarity with the permanent files used in the sample job control streams is assumed. Brief descriptions of these files are provided in Appendix B.

A.1 ROSCOE EXECUTION USING BINARY FILES

To execute ROSCOE in its binary form with no program changes the user would utilize a job stream similar to the one shown below:

```
JOB CARD
ACCOUNT CARD
ATTACH(XX1,OBINARY,ID=GRCXJJB,CY=1)
COPYBR(XX1,XXO,240)
ATTACH(XX2,OBINARY,ID=GRCXJJB,CY=2)
COPYBF(XX2,XXO)
REWIND(XXO)
ATTACH(STRUCT,OSTRUCT,ID=GRCXJJB)
UPDATE(P=STRUCT,F,D,8,C=TAPE1,L=1)
BCPYL(TAPE1,OBIN,LFILE,,,READ,REWIND,ERRORS)
RETURN(TAPE1,TAPE4,BCPYL)
ATTACH(DATDEK,ROSCOEDATA,ID=GRCXJJB)
UPDATA(P=DATDEK,Q,C=INDATA,D)
RETURN(DATDEK)
```

```
ATTACH(RLIBE,RLIBEROSCOE,ID=GRCXJJB)
RETURN(TAPE1,TAPE2,TAPE3,TAPE4,TAPE5,TAPE6)
ATTACH(AMALGM8,AMALGM8ROSCOE,ID=GRCXJJB)
AMALGM8.
RETURN(AMALGM8)
LDSET(LIB=RLIBE,PRESET=ZERO,FILES=TAPE1)
LOAD(FILE)
NOGO.
RETURN(LFILE)
RETURN(RLIBE)
ATTACH(TAPE3,NEWDATROSCOE,ID=GRCXJJB)
SENSER(PL=10000,,,,,,,,,,,,,,,NPR,NFLX)
7/8/9
*IDENT QCHG
*COMPILE STRUCT
.
.
.
OSTRUCT CHANGES
.
.
.
7/8/9
*IDENT QCHG
*COMPILE DATA
.
.
.
ROSCOEDATA CHANGES
.
.
.
6/7/8/9
```

A.2 ROSCOE EXECUTION WITH UPDATES

To execute ROSCOE with temporary changes to the ROSCOE subroutines and overlay structure the user would use a job stream similar to the one shown below:

```
JOB CARD
ACCOUNT CARD
MAP(OFF)
ATTACH(V3,ALLDECKS,ID=WDNA14X3)
COPYCR(INPUT,UPDIR)
REWIND(UPDIR)
COPYSBF(UPDIR,OUTPUT)
REWIND(UPDIR)
UPDATE(V3,UPDIR)
RFL(100000)
FTN(I=COMPILE,LCM=I,B=MODPR,R)
REDUCE.
RETURN(COMPILE)
ATTACH(XX1,OBINARY,ID=GRCXJJB,CY=1)
COPYBR(XX1,XXO,240)
ATTACH(XX2,OBINARY,ID=GRCXJJB,CY=2)
COPYBF(XX2,XXO)
REWIND(XXO)
ATTACH(BCPYL,BCPYLROSCOE,ID=GRCXJJB,CY=3)
REWIND(MODPR)
BCPYL(XXO,MODPR,OBIN,,,APPEND)
RETURN(XX1,XX2,XXO)
RETURN(TAPE4,MODPR)
ATTACH(STRUCT,OSTRUCT,ID=GRCXJJB)
UPDATE(P=STRUCT,F,D,8,C=TAPE1,L=1)
BCYPL(TAPE1,OBIN,LFILE,,,READ1,REWIND,ERRORS)
RETURN(TAPE1,TAPE4,BCPYL)
ATTACH(DATDEK,ROSCOEDATA,ID=GRCXJJB)
UPDATE(P=DATDEK,Q,C=INDATA,D)
RETURN(DATDEK)
ATTACH(RLIBE,RLIBEROSCOE,ID=GRCXJJB)
```

```
RETURN(TAPE1,TAPE2,TAPE3,TAPE4,TAPE5,TAPE6)
ATTACH(AMALGM8,AMALGM8ROSCOE,ID=GRCXJJB)
AMALGM8.
RETURN(AMALGM8)
LDSET(LIB=RLIBE,PRESET=ZERO,FILES=TAPE1)
LOAD(LFILE)
NOGO.
RETURN(LFILE)
RETURN(RLIBE)
ATTACH(TAPE3,NEWDATROSCOE,ID=GRCXJJB)
SENSER(PL=10000,,,,,,,,,,,,,,,NPR,NFLX)
7/8/9
*IDENT QCHG
PROGRAM CHANGES(*COMPILE CARDS FOR ALL DECKS BEING CHANGED)
.
.
.
7/8/9
*IDENT QCHG
*COMPILE STRUCT
.
.
.
OSTRUCT CHANGES
.
.
.
7/8/9
*IDENT QCHG
*COMPILE DATA
.
.
.ROSCOEDATA CHANGES
.
.
.
6/7/8/9
```

APPENDIX B

PERMANENT FILE DESCRIPTIONS

Brief descriptions of permanent files utilized during ROSCOE executions are provided below:

ALLDECKS - UPDATE library containing basic ROSCOE routines with dataset comdecks inserted.

OBINARY,CY=1 - First 240 routines of optics binaries.

OBINARY,CY=2 - All routines of optics binaries after first 240.

BCPYLROSCOE - Program to manipulate relocatable binary files in preparation for use by the system loader.

OSTRUCT - Optics version of overlay structure file in UPDATE library form.

ROSCOEDATA - New ROSCOE data deck in UPDATE library form.

RLIBEROSCOE - Binary file containing ROSCOE auxiliary routines.

AMALGM8ROSCOE - Program to merge data files.

NEWDATROSCOE - Auxiliary optics data file.

Blank

APPENDIX C

ROSCOE DATA PACKAGE

```
*DECK DATA                                                          DATA      1    A
ROSCOE**  NEW VERSION OF NUCLEAR PHENOMENOLOGY CODE*                 DATA      2    A
02 TEST RUN FOR ROSCOE PROGRAM                                      DATA      3    A
IS EARTH ROTATING FOR THIS RUN          YES                         DATA      4    A
STARTING RANDOM NUMBER                  2.7192                      DATA      5    A
*   SCALE FACTORS USED IN ROSCOE DATA (STANDARD UNITS ARE CGS)      BOX PAGE  DATA      6    A
*  SCALE FACTOR CHANGES TO CONVERT INTO CGS SYSTEM                  PRINT     DATA      7    A
CONVERSION TO MHZ                       MHZ       1000000.          SCALE     DATA      8    A
CONVERSION TO KHZ                       KHZ       1000.             SCALE     DATA      9    A
FRACTIONAL HOURS                        HRS       1.0               SCALE     DATA     10    A
KILOGRAM INPUTS                         KG        1000.0            SCALE     DATA     11    A
GRAM INPUTS                             GM        1.0               SCALE     DATA     12    A
CENTIMETER INPUTS                       CM        1.0               SCALE     DATA     13    A
*  HERE WE REDEFINE THE APPROPRIATE SCALE FACTORS BUILT INTO FLEXRED PRINT     DATA     14    A
FEET TO CENTIMETERS                     FT        30.48006          SCALE     DATA     15    A
PSF TO GM/CM**2                         PSF       .4882405          SCALE     DATA     16    A
KILOMETERS TO CENTIMETERS               KM        100000.0          SCALE     DATA     17    A
NAUTICAL MILES TO CENTIMETERS           NMI       185325.0          SCALE     DATA     18    A
POUNDS TO GRAMS                         LB        453.592           SCALE     DATA     19    A
ACCELERATION UNITS                      G         980.665           SCALE     DATA     20    A
METERS TO CENTIMETERS                   M         100.0             SCALE     DATA     21    A
METERS**2 TO CENTIMETERS**2             MSQ       10000.0           SCALE     DATA     22    A
KILOFEET TO CENTIMETERS                 KFT       30480.06          SCALE     DATA     23    A
MEGATON = THE FUNDAMENTAL YIELD UNIT    MT        1.0               SCALE     DATA     24    A
NAUTICAL MILES TO CENTIMETERS           NM        1.85E+05          SCALE     DATA     25    A
KILOTONS TO MEGATONS                    KT        .001              SCALE     DATA     26    A
KILOMETERS ON SQUARE METERS             KMSQM     10000.0           SCALE     DATA     27    A
NAUTICAL MILES RANGE ON 1 SQ. METER     NMSQM     1.85E4            SCALE     DATA     28    A
KILOFEET ON SQUARE METERS               KFSQM     3048.006          SCALE     DATA     29    A
WATTS TO ERGS/SEC                       WATTS     10000000.         SCALE     DATA     30    A
INCHES**2 TO CM**2                      INSQ      6.4516            SCALE     DATA     31    A
FT**2 TO CM**2                          FTSQ      929.0304          SCALE     DATA     32    A
*   THIS IS THE BASIC DATASET FOR ROSCOE                            BOX PAGE  DATA     33    A
ROSCOE BASIC DATA SET                                               BASIC     DATA     34    A
ROSCOE BASIC DATA SET                                               BEG SET   DATA     35    A
EVENT LIST                                                          REFER     DATA     36    A
OUTPUT SUMMARY DATASET                                              REFER     DATA     37    A
OVERLAY STRUCTURE DATASET                                           REFER     DATA     38    A
INSTRUCTIONS FOR INTERNAL OUTPUTS                                   REFER     DATA     39    A
          SPACE FOR OBJECT LIST         1.0                         ZEROS     DATA     40    A
          SPACE FOR RADAR LIST          1.0                         ZEROS     DATA     41    A
AD HOC DATA SET FOR TRACKER INITIALIZATION                          REFER     DATA     42    A
SPACE FOR THE BURST LIST                1.0                         ZEROS     DATA     43    A
SPACE FOR FIREBALL LIST                 1.0                         ZEROS     DATA     44    A
SPACE FOR *CONST*                       0.0                                   DATA     45    A
SPACE FOR *FRLIS* (LAMB)                0.0                                   DATA     46    A
SPACE FOR *FHLIS*  (HEAVE)              0.0                                   DATA     47    A
SPACE FOR OFSET                         1.0                         ZEROS     DATA     48    A
SPACE FOR MAGNETIC FIELD DATASET        1.0                         ZEROS     DATA     49    A
HEAVE COORDINATE DATASET                                            REFER     DATA     50    A
SHOULD WE TURN ON HYDRO FOR LA FBS      NO                                    DATA     51    A
DO YOU WANT STRIATION CALCULATIONS      YES                                   DATA     52    A
```

```
DO YOU WANT PRINTER PLOTS OF HAFB-S      YES                              DATA    53   A
SPACE FOR INTERNAL USE                   2.0                  ZEROS       DATA    54   A
DO YOU WANT FB DATA RELATIVE TO RADAR    NO                               DATA    55   A
        SENSOR NETTING                   NO                               DATA    56   A
DO YOU WANT TIME INTERPULATION           NO                               DATA    57   A
SPACE FOR OPTICAL SENSOR LIST            1.0                  ZEROS       DATA    58   A
SPACE FOR OPTICAL MEASUREMENTS           1.0                  ZEROS       DATA    59   A
BASIC CLOUD DATASET                      1.0                  ZEROS       DATA    60   A
        OPTICS CALC SPEED OPTION         SLOW                             DATA    61   A
        EVPROC OUTPUT SUPPRESS FLAG      1.       INT                     DATA    62   A
        OVERLAY SEP. FILE FLAG           1.0      INT                     DATA    63   A
*   FLAGS FOR TURNING ON DEBUG PRINTOUT BY OVERLAY            BOX PAGE    DATA    64   A
INSTRUCTIONS FOR INTERNAL OUTPUTS                             BEG SET     DATA    65   A
EVENT 1 OUTPUT                           NO                               DATA    66   A
EVENT 2 OUTPUT                           NO                               DATA    67   A
EVENT 3 OUTPUT                           NO                               DATA    68   A
EVENT 4 OUTPUT                           NO                               DATA    69   A
EVENT 5 OUTPUT                           NO                               DATA    70   A
EVENT 6 OUTPUT                           NO                               DATA    71   A
EVENT 7 OUTPUT                           NO                               DATA    72   A
EVENT 8 OUTPUT                           NO                               DATA    73   A
EVENT 9 OUTPUT                           NO                               DATA    74   A
EVENT 10 OUTPUT                          NO                               DATA    75   A
EVENT 11 OUTPUT                          NO                               DATA    76   A
EVENT 12 OUTPUT                          NO                               DATA    77   A
EVENT 13 OUTPUT                          NO                               DATA    78   A
EVENT 14 OUTPUT                          NO                               DATA    79   A
EVENT 15 OUTPUT                          NO                               DATA    80   A
EVENT 16 OUTPUT                          NO                               DATA    81   A
EVENT 17 OUTPUT                          NO                               DATA    82   A
EVENT 18 OUTPUT                          NO                               DATA    83   A
EVENT 19 OUTPUT                          NO                               DATA    84   A
EVENT 20 OUTPUT                          NO                               DATA    85   A
EVENT 21 OUTPUT                          NO                               DATA    86   A
EVENT 22 OUTPUT                          NO                               DATA    87   A
EVENT 23 OUTPUT                          NO                               DATA    88   A
EVENT 24 OUTPUT                          NO                               DATA    89   A
EVENT 25 OUTPUT                          NO                               DATA    90   A
EVENT 26 OUTPUT                          NO                               DATA    91   A
EVENT 27 OUTPUT                          NO                               DATA    92   A
EVENT 28 OUTPUT                          NO                               DATA    93   A
EVENT 29 OUTPUT                          NO                               DATA    94   A
EVENT 30 OUTPUT                          NO                               DATA    95   A
EVENT 31 OUTPUT                          NO                               DATA    96   A
EVENT 32 OUTPUT                          NO                               DATA    97   A
*   OVERLAY CALLING STRUCTURE (ALTERNATE OVERLAYS CAN BE CALLED HERE) BOX PAGE DATA 98  A
OVERLAY STRUCTURE DATASET                                     BEG SET     DATA    99   A
EVENT 1 CALLS OVERLAY                    1.0      INT                     DATA   100   A
EVENT 2 CALLS OVERLAY                    2.0      INT                     DATA   101   A
EVENT 3 CALLS OVERLAY                    3.0      INT                     DATA   102   A
EVENT 4 CALLS OVERLAY                    4.0      INT                     DATA   103   A
EVENT 5 CALLS OVERLAY                    5.0      INT                     DATA   104   A
```

EVENT 6 CALLS OVERLAY	6.0	INT		DATA	105	A
EVENT 7 CALLS OVERLAY	7.0	INT		DATA	106	A
EVENT 8 CALLS OVERLAY	8.0	INT		DATA	107	A
EVENT 9 CALLS OVERLAY	9.0	INT		DATA	108	A
EVENT 10 CALLS OVERLAY	10.0	INT		DATA	109	A
EVENT 11 CALLS OVERLAY	11.0	INT		DATA	110	A
EVENT 12 CALLS OVERLAY	12.	INT		DATA	111	A
EVENT 13 CALLS OVERLAY	13.	INT		DATA	112	A
EVENT 14 CALLS OVERLAY	14.0	INT		DATA	113	A
EVENT 15 CALLS OVERLAY	15.0	INT		DATA	114	A
EVENT 16 CALLS OVERLAY	16.0	INT		DATA	115	A
EVENT 17 CALLS OVERLAY	17.0	INT		DATA	116	A
EVENT 18 CALLS OVERLAY	18.0	INT		DATA	117	A
EVENT 19 CALLS OVERLAY	19.0	INT		DATA	118	A
EVENT 20 CALLS OVERLAY	20.0	INT		DATA	119	A
EVENT 21 CALLS OVERLAY	21.0	INT		DATA	120	A
EVENT 22 CALLS OVERLAY	22.0	INT		DATA	121	A
EVENT 23 CALLS OVERLAY	23.0	INT		DATA	122	A
EVENT 24 CALLS OVERLAY	24.0	INT		DATA	123	A
EVENT 25 CALLS OVERLAY	25.	INT		DATA	124	A
EVENT 26 CALLS OVERLAY	26.	INT		DATA	125	A
EVENT 27 CALLS OVERLAY	27.	INT		DATA	126	A
EVENT 28 CALLS OVERLAY	28.	INT		DATA	127	A
EVENT 29 CALLS OVERLAY	29.	INT		DATA	128	A
EVENT 30 CALLS OVERLAY	30.	INT		DATA	129	A
EVENT 31 CALLS OVERLAY	31.	INT		DATA	130	A
EVENT 32 CALLS OVERLAY	32.	INT		DATA	131	A
* OUTPUT DATASETS AND FORMATS (MAY BE CHANGED BY USER)			BOX PAGE	DATA	132	A
OUTPUT SUMMARY DATASET			BEG SET	DATA	133	A
SYSTEM OUTPUT LIST			REFER	DATA	134	A
TRAJECTORY OUTPUT FORMAT LIST			REFER	DATA	135	A
TRACK MEAS. ERRORS FORMAT LIST			REFER	DATA	136	A
TRACK FILE OUTPUT FORMAT LIST			REFER	DATA	137	A
PROPAGATION OUTPUT FORMAT LIST			REFER	DATA	138	A
DISCRIMINATION OUTPUT FORMAT LIST			REFER	DATA	139	A
FIREBALL POSITION OUTPUT FORMAT LIST			REFER	DATA	140	A
BO OUTPUT LIST	1.0		ZEROS	DATA	141	A
F1 OUTPUT LIST	1.0		ZEROS	DATA	142	A
F2 OUTPUT LIST	1.0		ZEROS	DATA	143	A
F3 OUTPUT LIST	1.0		ZEROS	DATA	144	A
F4 OUTPUT LIST	1.0		ZEROS	DATA	145	A
D1 OUTPUT LIST	1.0		ZEROS	DATA	146	A
BE OUTPUT LIST	1.0		ZEROS	DATA	147	A
CO OUTPUT LIST	1.0		ZEROS	DATA	148	A
OM OUTPUT LIST	1.0		ZEROS	DATA	149	A
OS OUTPUT LIST	1.0		ZEROS	DATA	150	A
OP OUTPUT LIST	1.0		ZEROS	DATA	151	A
OC OUTPUT LIST	1.0		ZEROS	DATA	152	A
BO OUTPUT FORMAT LIST			REFER	DATA	153	A
F1 OUTPUT FORMAT LIST			REFER	DATA	154	A
F2 OUTPUT FORMAT LIST			REFER	DATA	155	A
F3 OUTPUT FORMAT LIST			REFER	DATA	156	A

```
F4 OUTPUT FORMAT LIST                                                    REFER    DATA    157    A
D1 OUTPUT FORMAT LIST                                                    REFER    DATA    158    A
BE OUTPUT FORMAT LIST                                                    REFER    DATA    159    A
CO OUTPUT FORMAT LIST                                                    REFER    DATA    160    A
OM OUTPUT FORMAT LIST                                                    REFER    DATA    161    A
OS OUTPUT FORMAT LIST                                                    REFER    DATA    162    A
OP OUTPUT FORMAT LIST                                                    REFER    DATA    163    A
OC OUTPUT FORMAT LIST                                                    REFER    DATA    164    A
TRAJECTORY OUTPUT FORMAT LIST                                            BEG LIST DATA    165    A
TRAJECTORY OUTPUT FORMAT                                                 REFER    DATA    166    A
TRACK MEAS, ERRORS FORMAT LIST                                           BEG LIST DATA    167    A
TRACK MEASUREMENT ERRORS FORMAT                                          REFER    DATA    168    A
TRACK FILE OUTPUT FORMAT LIST                                            BEG LIST DATA    169    A
TRACK FILE OUTPUT FORMAT                                                 REFER    DATA    170    A
PROPAGATION OUTPUT FORMAT LIST                                           BEG LIST DATA    171    A
PROPAGATION OUTPUT FORMAT                                                REFER    DATA    172    A
DISCRIMINATION OUTPUT FORMAT LIST                                        BEG LIST DATA    173    A
DISCRIMINATION OUTPUT FORMAT                                             REFER    DATA    174    A
FIREBALL POSITION OUTPUT FORMAT LIST                                     BEG LIST DATA    175    A
FIREBALL POSITION OUTPUT FORMAT                                          REFER    DATA    176    A
BO OUTPUT FORMAT LIST                                                    BEG LIST DATA    177    A
BO OUTPUT FORMAT DATASET                                                 REFER    DATA    178    A
F1 OUTPUT FORMAT LIST                                                    BEG LIST DATA    179    A
F1 OUTPUT FORMAT DATASET                                                 REFER    DATA    180    A
F2 OUTPUT FORMAT LIST                                                    BEG LIST DATA    181    A
F2 OUTPUT FORMAT DATASET                                                 REFER    DATA    182    A
F3 OUTPUT FORMAT LIST                                                    BEG LIST DATA    183    A
F3 OUTPUT FORMAT DATASET                                                 REFER    DATA    184    A
F4 OUTPUT FORMAT LIST                                                    BEG LIST DATA    185    A
F4 OUTPUT FORMAT DATASET                                                 REFER    DATA    186    A
D1 OUTPUT FORMAT LIST                                                    BEG LIST DATA    187    A
D1 OUTPUT FORMAT DATASET                                                 REFER    DATA    188    A
BE OUTPUT FORMAT LIST                                                    BEG LIST DATA    189    A
BE OUTPUT FORMAT DATASET                                                 REFER    DATA    190    A
CO OUTPUT FORMAT LIST                                                    BEG LIST DATA    191    A
CO OUTPUT FORMAT DATASET                                                 REFER    DATA    192    A
OC OUTPUT FORMAT LIST                                                    BEG LIST DATA    193    A
OC OUTPUT FORMAT DATASET                                                 REFER    DATA    194    A
OM OUTPUT FORMAT LIST                                                    BEG LIST DATA    195    A
OM OUTPUT FORMAT DATASET                                                 REFER    DATA    196    A
OS OUTPUT FORMAT LIST                                                    BEG LIST DATA    197    A
OS OUTPUT FORMAT DATASET                                                 REFER    DATA    198    A
OP OUTPUT FORMAT LIST                                                    BEG LIST DATA    199    A
OP OUTPUT FORMAT DATASET                                                 REFER    DATA    200    A
*  AND NOW FOR THE INDIVIDUAL OUTPUT INSTRUCTIONS                        PRINT    DATA    201    A
TRACK FILE OUTPUT FORMAT                                                 BEG SET  DATA    202    A
TYPE OF OUTPUT REQUESTED                  CUTCOL                                 DATA    203    A
                    TRACKING ERRORS                                      TITLE    DATA    204    A
TIME COLUMN                    01014.0    TIME   OF OUTPUT SEC         OUTCOL   DATA    205    A
POSITION ERRORS          004024           ERRORS IN  ALONG V  M         OUTCOL   DATA    206    A
POSITION ERRORS          03034            POSITION--PERP TO V M         OUTCOL   DATA    207    A
POSITION ERRORS          02044            ---------- ACROSS V M         OUTCOL   DATA    208    A
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VELOCITY ERRORS              07054    ERRORS  IN ALONG V  M          OUTCOL    DATA    209   A
VELOCITY ERRORS              06064    VELOCITY-- PERP TO VM          OUTCOL    DATA    210   A
VELOCITY ERRORS              05074    ---------- CROSS V  M          OUTCOL    DATA    211   A
TARGET POSITION              08084      APPARENT  RANGE   M          OUTCOL    DATA    212   A
TARGET POSITION              09094      TARGET   AZIMUTH  DEG        OUTCOL    DATA    213   A
TARGET POSITION              10004    POSITION  ELEVATION DEG        OUTCOL    DATA    214   A
TRAJECTORY OUTPUT FORMAT                                             BEG SET   DATA    215   A
TYPE OF OUTPUT REQUESTED              OUTCOL                                   DATA    216   A
                TRAJECTORY OUTPUT                                    TITLE     DATA    217   A
EVENT TYPE                   01019       TYPE    OF EVENT            OUTCOL    DATA    218   A
TIME OF OUTPUT               02024       TIME   OF OUTPUT SEC        OUTCOL    DATA    219   A
ALTITUDE                     03034      POSITION ALTITUDE M          OUTCOL    DATA    220   A
RANGE                        04044     DATA FOR   RANGE   M          OUTCOL    DATA    221   A
AZIMUTH                      05054    OBJECT AT  AZIMUTH  DEG        OUTCOL    DATA    222   A
ELEVATION                    06064    SPECIFIED ELEVATION DEG        OUTCOL    DATA    223   A
VELOCITY                     07074    TIME------ VELOCITY M          OUTCOL    DATA    224   A
SIGNAL TO NOISE              08084    ----------SIGNAL TO NOISE (DB)OUTCOL     DATA    225   A
NUMBER OF TARGETS            09096    NUMBER OF  TARGETS             OUTCOL    DATA    226   A
TRACK MEASUREMENT ERRORS FORMAT                                      BEG SET   DATA    227   A
TYPE OF OUTPUT REQUESTED              OUTCOL                                   DATA    228   A
                TRACK MEASUREMENT ERRORS                             TITLE     DATA    229   A
TIME OF OUTPUT               01014       TIME   OF OUTPUT SEC        OUTCOL    DATA    230   A
PREDICTED RANGE              02024    PREDICTED   RANGE   M          OUTCOL    DATA    231   A
PREDICTED AZIMUTH            03034    PREDICTED  AZIMUTH  DEG        OUTCOL    DATA    232   A
PREDICTD ELEVATION           04044    PREDICTED ELEVATION DEG        OUTCOL    DATA    233   A
MEASURED RANGE               05054     MEASURED   RANGE   M          OUTCOL    DATA    234   A
MEASURED AZIMUTH             06064     MEASURED  AZIMUTH  DEG        OUTCOL    DATA    235   A
MEASURED ELEVATION           07074     MEASURED ELEVATION DEG        OUTCOL    DATA    236   A
RANDOM ERRORS                08084        RANDOM  RANGE   M          OUTCOL    DATA    237   A
RANDOM ERRORS                09094    ERRORS--IN AZIMUTH  DEG        OUTCOL    DATA    238   A
RANDOM ERRORS                10004    RAE COORDSELEVATION DEG        OUTCOL    DATA    239   A
PROPAGATION OUTPUT FORMAT                                            BEG SET   DATA    240   A
TYPE OF OUTPUT REQUESTED              OUTCOL                                   DATA    241   A
                PROPAGATION OUTPUT                                   TITLE     DATA    242   A
TIME OF OUTPUT               01014       TIME   OF OUTPUT SEC        OUTCOL    DATA    243   A
ABSORPTION FROM ALL SOURCES  02024    ABSORPTION FROM ALL  SOURCES   OUTCOL    DATA    244   A
THRESHOLD ABSORPTION         03034    THRESHOLD ABSORPTION           OUTCOL    DATA    245   A
NOISE TEMPERATURE            04044      NOISE      TEMP.             OUTCOL    DATA    246   A
NOISE POWER                  05052      NOISE      POWER             OUTCOL    DATA    247   A
CLUTTER POWER                06062     CLUTTER     POWER             OUTCOL    DATA    248   A
CLUTTER-TO-NOISE RATIO       06064     CLUTTER-  TO-NOISE RATIO (DB)OUTCOL     DATA    249   A
DISPERSIVE LOSS              13074    DISPERSIVE    LOSS             OUTCOL    DATA    250   A
FARADARY ROTATION LOSS       14084     FARADAY   ROTATION     LOSS   OUTCOL    DATA    251   A
FAILURE MODE                 15099     FAILURE     MODE              OUTCOL    DATA    252   A
TIME OF OUTPUT               01114       TIME   OF OUTPUT SEC        OUTCOL    DATA    253   A
REFRACTION                   07134          BIAS  RANGE   M          OUTCOL    DATA    254   A
REFRACTION                   08144    REFRACTION AZIMUTH  DEG        OUTCOL    DATA    255   A
REFRACTION                   09154    ERRORS      ELEVATIONDEG       OUTCOL    DATA    256   A
REFRACTION                   10174        RANDOM  RANGE   M          OUTCOL    DATA    257   A
REFRACTION                   11184    REFRACTION AZIMUTH  DEG        OUTCOL    DATA    258   A
REFRACTION                   12194    ERRORS      ELEVATIONDEG       OUTCOL    DATA    259   A
DISCRIMINATION OUTPUT FORMAT                                         BEG SET   DATA    260   A
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TYPE OF OUTPUT REQUESTED                       OUTCOL                                      DATA       261    A
                    DISCRIMINATION OUTPUT                                       TITLE      DATA       262    A
TYPE                         01019      TYPE   OF DISCRIM                       OUTCOL     DATA       263    A
TIME OF OUTPUT               02024      TIME   OF OUTPUT SEC                    OUTCOL     DATA       264    A
ESTIMATED LENGTH             03034    ESTIMATED  LENGTH  M                      OUTCOL     DATA       265    A
DEVIATION IN LENGTH          04044   DEVIATION IN LENGTH M                      OUTCOL     DATA       266    A
MEASUREMENT TYPE             05059      MEAS      TYPE                          OUTCOL     DATA       267    A
MINIMUM RCS                  06061    MINIMUM     RCS    MSQ                    OUTCOL     DATA       268    A
ONE-WAY ATTENUATION          07071    ONE-WAY    ATTEN        DB                OUTCOL     DATA       269    A
FIREBALL POSITION OUTPUT FORMAT                                                 BEG SET    DATA       270    A
TYPE OF OUTPUT                                 OUTCOL                                      DATA       271    A
                    FB COORDINATES RELATIVE TO RADAR                            TITLE      DATA       272    A
TIME OF OUTPUT               01014      TIME   OF OUTPUT SEC                    OUTCOL     DATA       273    A
FIREBALL INDEX               02026    FIREBALL   INDEX                          OUTCOL     DATA       274    A
FB RANGE                     03034    FIREBALL   RANGE   M                      OUTCOL     DATA       275    A
FB AZIMUTH                   04044    FIREBALL  AZIMUTH  DEG                    OUTCOL     DATA       276    A
FB ELEVATION                 05054    FIREBALL ELEVATION DEG                    OUTCOL     DATA       277    A
FB ANGULAR EXTENT            06064   FB ANGULAR  EXTENT  DEG                    OUTCOL     DATA       278    A
FB RANGE EXTENT              07074   FB RANGE    EXTENT  M                      OUTCOL     DATA       279    A
RANGE CELL                   08084     RANGE      CELL   M                      OUTCOL     DATA       280    A
CLUTTER TO NOISE             09094    CLUTTER-  TO-NOISE RATIO (DB)             OUTCOL     DATA       281    A
INCREMENTAL ABSORPTION       10002   ABSORPTION GRADIENT  (DB/KM)               OUTCOL     DATA       282    A
BO OUTPUT FORMAT DATASET                                                        BEG SET    DATA       283    A
         TYPE OF OUTPUT                        OUTCOL                                      DATA       284    A
         BURST PARAMETERS                                                       TITLE      DATA       285    A
         TIME OF OUTPUT      01014      TIME   OF OUTPUT SEC                    OUTCOL     DATA       286    A
         TOTAL ENERGY        02022      TOTAL     ENERGY    (ERGS)              OUTCOL     DATA       287    A
         FISSION ENERGY      03032     FISSION    ENERGY    (ERGS)              OUTCOL     DATA       288    A
         BURST ALTITUDE      04044      BURST     ALTITUDE KM                   OUTCOL     DATA       289    A
         BURST POINT DENSITY 05052   BURST PT.   DENSITY   (GM/CC)              OUTCOL     DATA       290    A
         BURST SCALE HEIGHT  06064      SCALE      HEIGHT  KM                   OUTCOL     DATA       291    A
         BURST POINT TEMP    07074   BURST PT.     TEMP    (DEG K)              OUTCOL     DATA       292    A
         INITIAL FB RADIUS   08084    INITIAL     RADIUS   KM                   OUTCOL     DATA       293    A
         TIME TO REACH 3000K 09094      TIME     TO REACH   3000K               OUTCOL     DATA       294    A
         TIME TO REACH 2000K 10004      TIME     TO REACH   2000K               OUTCOL     DATA       295    A
F1 OUTPUT FORMAT DATASET                                                        BEG SET    DATA       296    A
         TYPE OF OUTPUT                        OUTCOL                                      DATA       297    A
         FIREBALL SET-1                                                         TITLE      DATA       298    A
         TIME OF OUTPUT      01014      TIME   OF OUTPUT SEC                    OUTCOL     DATA       299    A
         FIREBALL INDEX      02026    FIREBALL    INDEX     NUMBER              OUTCOL     DATA       300    A
         HORIZONTAL RADIUS   03034   HORIZONTAL   RADIUS   KM                   OUTCOL     DATA       301    A
         VERTICAL RADIUS     04044    VERTICAL    RADIUS   KM                   OUTCOL     DATA       302    A
         ALTITUDE            05054     CENTER    ALTITUDE  KM                   OUTCOL     DATA       303    A
         RISE RATE           06064      RISE        RATE   KM                   OUTCOL     DATA       304    A
         EXPANSION RATE      07074   EXPANSION      RATE   KM                   OUTCOL     DATA       305    A
         FIREBALL DENSITY    08082    FIREBALL   DENSITY   (GM/CC)              OUTCOL     DATA       306    A
         FIREBALL TEMP       09094    FIREBALL      TEMP   (DEG-K)              OUTCOL     DATA       307    A
         TIME SINCE BURST    10004   TIME SINCE   BURST    SEC                  OUTCOL     DATA       308    A
F2 OUTPUT FORMAT DATASET                                                        BEG SET    DATA       309    A
         TYPE OF OUTPUT                        OUTCOL                                      DATA       310    A
         FIREBALL SET-2                                                         TITLE      DATA       311    A
         TIME OF OUTPUT      01014      TIME   OF OUTPUT SEC                    OUTCOL     DATA       312    A
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      FIREBALL INDEX        02026      FIREBALL   INDEX     NUMBER  OUTCOL      DATA        313      A
      MINIMUM ALTITUDE      03034      MINIMUM    ALTITUDE KM       OUTCOL      DATA        314      A
      MAXIMUM ALTITUDE      04044      MAXIMUM    ALTITUDE KM       OUTCOL      DATA        315      A
      TILT FROM VERTICAL    05054     TILT FROM   VERTICAL DEG      OUTCOL      DATA        316      A
      AXIS ROTATION (CW-N)  06064        AXIS     ROTATION DEG      OUTCOL      DATA        317      A
      HOR VORTEX RADIUS     07074     HOR VORTEX  RADIUS  KM        OUTCOL      DATA        318      A
      VRT VORTEX RADIUS     08084     VRT VORTEX  RADIUS  KM        OUTCOL      DATA        319      A
      VORTEX VOLUME         09092       VORTEX    VOLUME     (CM3)  OUTCOL      DATA        320      A
      CHARACTERISTIC TIME   10004      CHARACT.     TIME    SEC     OUTCOL      DATA        321      A
F3 OUTPUT FORMAT DATASET                                            BEG SET     DATA        322      A
      TYPE OF OUTPUT                  OUTCOL                                    DATA        323      A
      FIREBALL SET-3                                                TITLE       DATA        324      A
      TIME OF OUTPUT        01014        TIME     OF OUTPUT SEC     OUTCOL      DATA        325      A
      FIREBALL INDEX        02026      FIREBALL   INDEX     NUMBER  OUTCOL      DATA        326      A
      X-COORDINATE          03032         X-      COORDINATE  (CM)  OUTCOL      DATA        327      A
      Y-COORDINATE          04042         Y-      COORDINATE  (CM)  OUTCOL      DATA        328      A
      Z-COORDINATE          05052         Z-      COORDINATE  (CM)  OUTCOL      DATA        329      A
      OVAL OF CASSINI TERM  06064      OVAL OF    CASSINI  PARAMETER OUTCOL     DATA        330      A
      OVAL ARM RADIUS       07074      OVAL ARM   RADIUS  KM        OUTCOL      DATA        331      A
      VORTEX TEMP           08084      VORTEX     TEMP    (DEG-K)   OUTCOL      DATA        332      A
      FIREBALL KIND         09096      FIREBALL   KIND              OUTCOL      DATA        333      A
      MERGE ID INDEX        10006      MERGE      ID       INDEX    OUTCOL      DATA        334      A
F4 OUTPUT FORMAT DATASET                                            BEG SET     DATA        335      A
      TYPE OF OUTPUT                  OUTCOL                                    DATA        336      A
      FIREBALL SET-4                                                TITLE       DATA        337      A
      TIME OF OUTPUT        01014        TIME     OF OUTPUT SEC     OUTCOL      DATA        338      A
      FIREBALL INDEX        02026      FIREBALL   INDEX     NUMBER  OUTCOL      DATA        339      A
      X-COORDINATE          03032         X-      COORDINATE  (CM)  OUTCOL      DATA        340      A
      Y-COORDINATE          04042         Y-      COORDINATE  (CM)  OUTCOL      DATA        341      A
      Z-COORDINATE          05052         Z-      COORDINATE  (CM)  OUTCOL      DATA        342      A
      CELL INDEX (X-DIR.)   06066     GRID CELL   INDEX   (X-DIR.)  OUTCOL      DATA        343      A
      CELL INDEX (Y-DIR.)   07076     GRID CELL   INDEX   (Y-DIR.)  OUTCOL      DATA        344      A
      CELL INDEX (Z-DIR.)   08086     GRID CELL   INDEX   (Z-DIR.)  OUTCOL      DATA        345      A
      FB REL. POS. IN CELL  09094      FIREBALL   REL. POS. IN CELL OUTCOL      DATA        346      A
      FIREBALL KIND         10006      FIREBALL   KIND              OUTCOL      DATA        347      A
D1 OUTPUT FORMAT DATASET                                            BEG SET     DATA        348      A
      TYPE OF OUTPUT                  OUTCOL                                    DATA        349      A
      DEBRIS PARAMETERS                                             TITLE       DATA        350      A
      TIME OF OUTPUT        01014        TIME     OF OUTPUT SEC     OUTCOL      DATA        351      A
      FIREBALL INDEX        02026      FIREBALL   INDEX     NUMBER  OUTCOL      DATA        352      A
      DEBRIS INDEX NUMBER   03036       DEBRIS    INDEX     NUMBER  OUTCOL      DATA        353      A
      TOTAL ENERGY          04042       TOTAL     ENERGY    (ERGS)  OUTCOL      DATA        354      A
      DEBRIS ALTITUDE       05054       DEBRIS    ALTITUDE KM       OUTCOL      DATA        355      A
      HORIZONTAL RADIUS     06064     HORIZONTAL  RADIUS  KM        OUTCOL      DATA        356      A
      VERTICAL RADIUS       07074      VERTICAL   RADIUS  KM        OUTCOL      DATA        357      A
      DEBRIS DISTRIBUTION   08084       DEBRIS    DISTRIB. PARAMETER OUTCOL     DATA        358      A
      EQUIVALENT SPH. RAD.  09094     EQUIVALENTSPH. RAD. KM        OUTCOL      DATA        359      A
      DEBRIS VOLUME         10002       DEBRIS    VOLUME     (CM3)  OUTCOL      DATA        360      A
BE OUTPUT FORMAT DATASET                                            BEG SET     DATA        361      A
      TYPE OF OUTPUT                  OUTCOL                                    DATA        362      A
      BETA TUBE PARAMETERS                                          TITLE       DATA        363      A
      TIME OF OUTPUT        01014        TIME     OF OUTPUT SEC     OUTCOL      DATA        364      A
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        FIREBALL INDEX NUMBER02026      FIREBALL   INDEX      NUMBER  OUTCOL    DATA    365    A
        BETATURE SHAPE        03039     BETATURE   SHAPE              OUTCOL    DATA    366    A
        INITIAL DIP ANGLE     04044     INITIAL  DIP ANGLE DEG        OUTCOL    DATA    367    A
        KINK ANGLE            05054    KINK ANGLEFROM HORIZDEG        OUTCOL    DATA    368    A
        KINK-BURST DISTANCE   06064    KINK-BURST DISTANCE KM         OUTCOL    DATA    369    A
        N-S RADIUS AT 85KM    07074    N-S RADIUS AT 85KM  KM         OUTCOL    DATA    370    A
        E-W RADIUS AT 85KM    08084    E-W RADIUS AT 85KM  KM         OUTCOL    DATA    371    A
        N-S RADIUS AT 60KM    09094    N-S RADIUS AT 60KM  KM         OUTCOL    DATA    372    A
        E-W RADIUS AT 60KM    10004    E-W RADIUS AT 60KM  KM         OUTCOL    DATA    373    A
CO OUTPUT FORMAT DATASET                                             BEG SET   DATA    374    A
        TYPE OF OUTPUT                 OUTCOL                        DATA    375    A
        DETAILED CHEMISTRY, REFLECTIVITY, AND ABSORPTION DATA        TITLE     DATA    376    A
        TIME OF OUTPUT        01014       TIME   OF OUTPUT SEC       OUTCOL    DATA    377    A
        FIREBALL INDEX        02026    FIREBALL   INDEX      NUMBER  OUTCOL    DATA    378    A
        ALTITUDE OF POINT     03034    ALTITUDE  OF POINT KM         OUTCOL    DATA    379    A
        RANGE FROM FB CENTER  04044    RANGE FROMFB CENTER KM         OUTCOL    DATA    380    A
        LOCATION OF POINT     05059    LOCATION  OF POINT             OUTCOL    DATA    381    A
        ELECTRON DENSITY      06062    ELECTRON  DENSITY    (CM-3)    OUTCOL    DATA    382    A
        POSITIVE ION DENSITY  07072    POSITIVE  ION DENS.  (CM-3)    OUTCOL    DATA    383    A
        TEMPERATURE AT POINT  08084      TEMP    AT POINT   (DEG-K)   OUTCOL    DATA    384    A
        DENSITY AT POINT      09092    DENSITY   AT POINT   (GM/CC)   OUTCOL    DATA    385    A
        ABSORPTION GRADIENT   10002    ABSORPTION GRADIENT  (DB/KM)   OUTCOL    DATA    386    A
OC OUTPUT FORMAT DATASET                                             BEG SET   DATA    387    A
        TYPE OF OUTPUT                 OUTCOL                        DATA    388    A
        COMMUNICATIONS OUTPUT                                        TITLE     DATA    389    A
        TYPE OF OUTPUT        01019       TYPE   OF OUTPUT          OUTCOL    DATA    390    A
        TIME OF OUTPUT        02024       TIME   OF OUTPUT SEC      OUTCOL    DATA    391    A
        UPLINK LOSS FACTOR    04034     UPLINK     LOSS     FACTOR  OUTCOL    DATA    392    A
        UPLINK SCINT.         07041     UPLINK     SCINT           OUTCOL    DATA    393    A
        DOWNLINK LOSS FACTOR  09054    DOWNLINK    LOSS     FACTOR  OUTCOL    DATA    394    A
        DOWNLINK SCINT.       12061    DOWNLINK    SCINT           OUTCOL    DATA    395    A
        PROB ERROR-SATELLITE  14071     PROB.    OF ERROR SATELLITE OUTCOL    DATA    396    A
        PROB ERROR-GROUND     15081     PROB.    OF ERROR    GROUND OUTCOL    DATA    397    A
        PROBABILITY OF ERROR  16091     PROB.    OF ERROR           OUTCOL    DATA    398    A
        TIME OF OUTPUT        02114    TIME OF     OUTPUT  SEC      OUTCOL    DATA    399    A
        RANGE S-FROM-T        19124     RANGE    S-FROM-T KM        OUTCOL    DATA    400    A
        AZM S-FROM-T          20134    AZIMUTH   S-FROM-T DEG       OUTCOL    DATA    401    A
        ELV S-FROM-T          21144    ELEVATION S-FROM-T DEG       OUTCOL    DATA    402    A
        RANGE S-FROM-R        22164     RANGE    S-FROM-R KM        OUTCOL    DATA    403    A
        AZM S-FROM-R          23174    AZIMUTH   S-FROM-R DEG       OUTCOL    DATA    404    A
        ELV S-FROM-R          24184    ELEVATION S-FROM-R DEG       OUTCOL    DATA    405    A
OM OUTPUT FORMAT DATASET                                             BEG SET   DATA    406    A
        TYPE OF OUTPUT                 OUTCOL                        DATA    407    A
        OPTICAL MEASUREMENTS                                         TITLE     DATA    408    A
        TIME OF OUTPUT        02014       TIME   OF OUTPUT SEC      OUTCOL    DATA    409    A
        WAVELENGTH            04022    CENTRAL   WAVELENGTHM        OUTCOL    DATA    410    A
        AZIMUTH               10032     ACTUAL     AZIMUTH  (RADIANS)OUTCOL    DATA    411    A
        ELEVATION             11042    --COORDS  ELEVATION (RADIANS)OUTCOL    DATA    412    A
        MEAS AZ               06052    MEASURED   AZIMUTH  (RADIANS)OUTCOL    DATA    413    A
        MEAS EL               07062    --COORDS  ELEVATION (RADIANS)OUTCOL    DATA    414    A
        EST AZ                08072    ESTIMATED  AZIMUTH  (RADIANS)OUTCOL    DATA    415    A
        EST EL                09082    --COORDS  ELEVATION (RADIANS)OUTCOL    DATA    416    A
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        IRRADIANCE              15092   IRRADIANCEAT SENSOR  (W/CM2)   OUTCOL    DATA    417    A
        SIGNAL-TO-NOISE         19002    SIGNAL-    TO-NOISE    (DB)   OUTCOL    DATA    418    A
OS OUTPUT FORMAT DATASET                                               BEG SET   DATA    419    A
        TYPE OF OUTPUT                  OUTCOL                                 DATA    420    A
        OPTICAL SAMPLES                                                TITLE     DATA    421    A
        TIME OF OUTPUT          01013     TIME   OF OUTPUT SEC         OUTCOL    DATA    422    A
        DETECTOR                02024   DETECTOR   NUMBER              OUTCOL    DATA    423    A
        WAVELENGTH              03032   CENTRAL  WAVELENGTHM           OUTCOL    DATA    424    A
        AZIMUTH                 04042    AZIMUTH   OFF-BORE (RADIANS)  OUTCOL    DATA    425    A
        ELEVATION               05052  ELEVATION  OFF-BORE (RADIANS)  OUTCOL    DATA    426    A
        IRRADIANCE              06062   SCANNED    SIGNAL    OUTPUT    OUTCOL    DATA    427    A
        NORMALIZED SIGNAL       07072  NORMALIZED  SIGNAL    OUTPUT    OUTCOL    DATA    428    A
        FINAL SIGNAL            09082    FINAL     SIGNAL    OUTPUT    OUTCOL    DATA    429    A
        TARGET FLAG             10099    TARGET  DETECTION   FLAG      OUTCOL    DATA    430    A
OP OUTPUT FORMAT DATASET                                               BEG SET   DATA    431    A
        TYPE OF OUTPUT                  OUTCOL                                 DATA    432    A
        INTEGRATED PATH DATA                                           TITLE     DATA    433    A
        TIME                    01014     TIME   OF OUTPUT SEC         OUTCOL    DATA    434    A
        WAVELENGTH              02022   CENTRAL  WAVELENGTHM           OUTCOL    DATA    435    A
        AZIMUTH                 03032    AZIMUTH   OFF-BORE (RADIANS)  OUTCOL    DATA    436    A
        ELEVATION               04042  ELEVATION  OFF-BORE (RADIANS)  OUTCOL    DATA    437    A
        RADIANCE                05052   RADIANCE (PHOTONS/ S-SR-CM2)  OUTCOL    DATA    438    A
        INTEGRATED RADIANCE     07062  INTEGRATED RADIANCE            OUTCOL    DATA    439    A
        SIGMA DUE TO STRCTR     08072  SIGMA DUE TO STRCTR            OUTCOL    DATA    440    A
*  THE EVENT LIST INCLUDING--                                          BOX PAGE  DATA    441    A
*       ATTACK GENERATION                                             BOX       DATA    442    A
*       RADAR                                                         BOX       DATA    443    A
*       COMMUNICATION                                                 BOX       DATA    444    A
*       OPTICS                                                        BOX       DATA    445    A
*       BURSTS                                                        BOX       DATA    446    A
*       ENVIRONMENT OUTPUT                                            BOX       DATA    447    A
EVENT LIST                                                            BEG LIST  DATA    448    A
ATTACK GENERATION DATASET                                             REFER     DATA    449    A
RADAR EVENT                                                           REFER     DATA    450    A
COMMUNICATIONS EVENT DATASET                                          REFER     DATA    451    A
OPTICS LOCK EVENT                                                     REFER     DATA    452    A
BURST EVENT DATASET-1                                                 REFER     DATA    453    A
BURST EVENT DATASET-2                                                 REFER     DATA    454    A
BURST EVENT DATASET-3                                                 REFER     DATA    455    A
BURST EVENT DATASET-4                                                 REFER     DATA    456    A
BURST EVENT DATASET-5                                                 REFER     DATA    457    A
ENVIRONMENT OUTPUT EVENT                                              REFER     DATA    458    A
STOP EVENT                                                            REFER     DATA    459    A
*   THE ATTACK GENERATION EVENT INCLUDING INITIALIZATION --           BOX PAGE  DATA    460    A
ATTACK GENERATION DATASET                                             BEG SET   DATA    461    A
     TYPE OF EVENT                  1.0       INT                              DATA    462    A
     TIME OF EVENT (DUMMY)          -5000.0   SEC                              DATA    463    A
ATTACK TYPE DATASET                                                   REFER     DATA    464    A
LAUNCH POINT LIST                                                     REFER     DATA    465    A
TARGET POINT LIST                                                     REFER     DATA    466    A
*  ATTACK TYPE DATASET                                                BOX       DATA    467    A
ATTACK TYPE DATASET                                                   BEG SET   DATA    468    A
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 TYPE OF ATTACK TO BE GENERATED          UNIFORM                                  DATA      469     A
  IS IT DAY OR NIGHT FOR B.O. CALCULS.   DAY                                      DATA      470     A
DAY OF ATTACK                            23          INT                         DATA      471     A
MONTH OF ATTACK                          9           INT                         DATA      472     A
YEAR OF ATTACK      (1900 AND-----       73          INT                         DATA      473     A
TIME OF DAY                              15.45       HRS                         DATA      474     A
        REF ALT                          200.        KM                          DATA      475     A
        REF LAT                          47.75       DEG                         DATA      476     A
        REF LONG                         -79.33      DEG                         DATA      477     A
INITIALIZATION FLAG                      0.          INT                         DATA      478     A
         REGION TYPE (1=RURAL)           1.          INT                         DATA      479     A
         VISABILTITY (1=50KM)            1.          INT                         DATA      480     A
         MSM                             1.          INT                         DATA      481     A
         DD                              .01                                     DATA      482     A
* THE LAUNCH POINTS                                                      BOX     DATA      483     A
LAUNCH POINT LIST                                                       BEG LIST DATA      484     A
THE LANCHOU LAUNCHERY                                                   REFER   DATA      485     A
*  HEREWITH THE INDIVIDUAL LAUNCH POINTS THEMSELVES ----------------    PRINT   DATA      486     A
REFERENCE FOR LAUNCH POINT                                              BEG SET DATA      487     A
COORD CENTER                             0.          -79.33      47.75  GEUGR   DATA      488     A
THE LANCHOU LAUNCHERY                                                   BEG SET DATA      489     A
  NAME OF LAUNCH POINT                   LANCHOU                                 DATA      490     A
        LAUNCH PT                        0.          105.        36.    GEUGR   DATA      491     A
BOOSTER TYPE NO.1                                                       REFER   DATA      492     A
OBJECT TYPE A                                                           REFER   DATA      493     A
        NUMBER OBJECTS                   0.          INT                         DATA      494     A
  (INTERNALLY USED)                      0.0                                     DATA      495     A
* THE TARGET POINTS                                                      BOX     DATA      496     A
TARGET POINT LIST                                                       BEG LIST DATA      497     A
  BUFFALO,NEW YORK                                                      REFER   DATA      498     A
* THE INDIVIDUAL TARGET POINTS FOLLOW      ----------------------       PRINT   DATA      499     A
REFERENCE FOR TARGET POINT                                              BEG SET DATA      500     A
COORD CENTER                             0.          -79.33      47.75  GEUGR   DATA      501     A
  BUFFALO,NEW YORK                                                      BEG SET DATA      502     A
  TARGET POINT NAME                      BUFFALO                                 DATA      503     A
        TARGET PT                        0.          0.          0.     LOCXYZ  DATA      504     A
        NUMBER OBJECTS                   0.          INT                         DATA      505     A
        IMPACT TIME OF 1ST               2000.       SEC                         DATA      506     A
        DELTA TIME BETWEEN OBJECTS       20.         SEC                         DATA      507     A
  SIGMA OF ARRIVAL TIMES                 0.0                                     DATA      508     A
  C.E.P. OF IMPACT LOCATION              0.0                                     DATA      509     A
  MODE INDICATOR (SEE RURB2 IN TRAID)    4.0         INT                         DATA      510     A
        REENTRY ANGLE                    20.         DEG                         DATA      511     A
SPACE FOR POINTER TO TARGET OUTPUT ARRAY 1.0                             ZEROS   DATA      512     A
SYSTEM OUTPUT LIST                                                      BEG LIST DATA      513     A
SYSTEM OUTPUT DATASET                                                   REFER   DATA      514     A
SYSTEM OUTPUT DATASET                                                   BEG SET DATA      515     A
        OBJECT NAME                      OBJECT 1                                DATA      516     A
        RADAR NAME                       RAD/8                                   DATA      517     A
        SPACES                           6.0                            ZEROS   DATA      518     A
*       SET UP HEAVE GRID                                               BOX     DATA      519     A
REFERENCE FOR HEAVE CENTER                                              BEG SET DATA      520     A
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COORD CENTER                           0.        -79.33    47.75    GEOGR     DATA       521    A
HEAVE COORDINATE DATASET                                            BEG SET   DATA       522    A
         ALTITUDE OF BOTTOM            90.       KM                           DATA       523    A
         HEAVE CENTER                  0.        0.        90.      LOCXYZ    DATA       524    A
         ANGULAR CELL SIZE IN X        .02                                    DATA       525    A
         ANGULAR CELL SIZE IN Y        .02                                    DATA       526    A
         NO VERTICAL CELLS             17.       INT                          DATA       527    A
         NUMBER OF CELLS IN POS. X-DIR. 3.       INT                          DATA       528    A
         NUMBER OF CELLS IN NEG. X-DIR. 3.       INT                          DATA       529    A
         NUMBER OF CELLS IN POS. Y-DIR. 3.       INT                          DATA       530    A
         NUMBER OF CELLS IN NEG. Y-DIR. 3.       INT                          DATA       531    A
         AZIMUTH OF GRID ALIGNMENT     MAGNETIC                               DATA       532    A
         NUMBER OF CELLS IN MAG. GRID  36.       INT                          DATA       533    A
         TIME AT LAST CALCULATION      -5000.    SEC                          DATA       534    A
         TIME AT NEW CALCULATION       0.        SEC                          DATA       535    A
         BURST FLAG (IXPLD)            0.        INT                          DATA       536    A
         ENERGY CHECK FLAG (IENCHK)    0.        INT                          DATA       537    A
         REZONE FLAG (IRZN)            0.        INT                          DATA       538    A
         SPACE FOR CELL HEIGHTS        20.                          ZEROS     DATA       539    A
         MAXIMUM ALTITUDE BEFORE REZONE 750.     KM                           DATA       540    A
*  OBJECT DEPENDENT DATA                                            BOX PAGE  DATA       541    A
*                                                                   PRINT     DATA       542    A
OBJECT LIST                                                         BEG LIST  DATA       543    A
REF-OBJECT                                                          REFER     DATA       544    A
OBJECT-1                                                            BEG SET   DATA       545    A
         NAME                          OBJECT 1                               DATA       546    A
OBJECT TYPE A                                                       REFER     DATA       547    A
OBJECT POSITION                                                     REFER     DATA       548    A
         KFLG                          ALIVE                                  DATA       549    A
RADAR CROSS SECTION DATASET                                         REFER     DATA       550    A
BODY AXIS ALONG VELOCITY TUMBLING MODEL                             REFER     DATA       551    A
         FILE                          1.0                          ZEROS     DATA       552    A
REFERENCE FOR OBJECT POSITION                                       BEG SET   DATA       553    A
COORD CENTER                           0.        -79.33    47.75    GEOGR     DATA       554    A
OBJECT POSITION                                                     BEG SET   DATA       555    A
                                       10.                          ZEROS     DATA       556    A
                                       -10000.   SEC                          DATA       557    A
         STATE TIME                    99999.    SEC                          DATA       558    A
         STATE POSITION                0.        50.       50.      LOCXYZ    DATA       559    A
         STATE VELOCITY                7.        -90.      -45.     POLAR     DATA       560    A
         STATE ACCEL.                  0.        0.        0.       LOCXYZ    DATA       561    A
COLUMBUS BOOSTER BETA TABLE                                         REFER     DATA       562    A
BETA MULTIPLIER                        0.                                     DATA       563    A
REF-OBJECT                                                          BEG SET   DATA       564    A
         NAME                          REF                                    DATA       565    A
OBJECT TYPE A                                                       REFER     DATA       566    A
REF OBJECT POSITION                                                 REFER     DATA       567    A
         KFLG                          ALIVE                                  DATA       568    A
         SPACES                        4.0                          ZEROS     DATA       569    A
REF. POSITION COORD. FOR LOCAL AXES                                 BEG SET   DATA       570    A
COORD. CENTER                          0.        -79.33    47.75    GEOGR     DATA       571    A
REF OBJECT POSITION                                                 BEG SET   DATA       572    A
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                                         10.                             ZEROS     DATA      573     A
                                         -10000.     SEC                           DATA      574     A
      STATE TIME                         0.          SEC                           DATA      575     A
      POSITION                           0.          -79.33     47.75    GEOGR     DATA      576     A
      VELOCITY                           3.0                             ZEROS     DATA      577     A
      ACCELERATION                       3.0                             ZEROS     DATA      578     A
      SPACES                             2.0                             ZEROS     DATA      579     A
*     BOOSTER TYPE DATA                                                  BOX       DATA      580     A
BOOSTER TYPE NO.1                                                        BEG SET   DATA      581     A
      NAME                               PLUME                                     DATA      582     A
THE LANCHCU LAUNCHERY                                                    REFER     DATA      583     A
BOOSTER STAGE LIST                                                       REFER     DATA      584     A
BOOSTER STAGE LIST                                                       BEG LIST  DATA      585     A
STAGE 1                                                                  REFER     DATA      586     A
STAGE 2                                                                  REFER     DATA      587     A
STAGE 2                                                                  BEG SET   DATA      588     A
      FUEL TYPE                          LIQUID                                    DATA      589     A
      THRUST                             135000.     LB                            DATA      590     A
      WTI                                20000.      LB                            DATA      591     A
      WTF                                8000.       LB                            DATA      592     A
      NOZA                               2000.       INSQ                          DATA      593     A
      TBURN                              0.          SEC                           DATA      594     A
      TSTEP                              5.          SEC                           DATA      595     A
      REFA                               35.         FTSQ                          DATA      596     A
      CX-M PAIR1                .03                  .5                  TABLE     DATA      597     A
       CX-M PAIR2               .136                 1.0                 TABLE     DATA      598     A
      CX-M PAIR3                .068                 3.0                 TABLE     DATA      599     A
STAGE 1                                                                  BEG SET   DATA      600     A
      FUEL TYPE                          LIQUID                                    DATA      601     A
      THRUST                             1100000.    LB                            DATA      602     A
      WTI                                70000.      LB                            DATA      603     A
      WTF                                35000.      LB                            DATA      604     A
      NOZA                               3000.       INSQ                          DATA      605     A
      TBURN                              0.          SEC                           DATA      606     A
      TSTEP                              1.          SEC                           DATA      607     A
      REFA                               35.         FTSQ                          DATA      608     A
      CX-M PAIR1                .10                  .5                  TABLE     DATA      609     A
      CX-M PAIR2                .19                  1.0                 TABLE     DATA      610     A
      CX-M PAIR3                .11                  3.0                 TABLE     DATA      611     A
*     OBJECT TYPE DATA                                                   BOX       DATA      612     A
OBJECT TYPE A                                                            BEG SET   DATA      613     A
  N-ME OF OBJECT TYPE                    OVERSHOE                                  DATA      614     A
COLUMBUS BOOSTER BETA TABLE                                              REFER     DATA      615     A
  RE-ENTRY ALTITUDE (WHERE DRAG STARTS)  100.0       KM                            DATA      616     A
RADAR CROSS SECTION DATASET                                              REFER     DATA      617     A
SPACE FOR BOMB                           1.0                             ZEROS     DATA      618     A
BODY AXIS ALONG VELOCITY TUMBLING MODEL                                  REFER     DATA      619     A
*  OBJECT TABULATED BETA                                                 BOX       DATA      620     A
COLUMBUS BOOSTER BETA TABLE                                              BEG SET   DATA      621     A
      MODEL TYPE                         1.0         INT                           DATA      622     A
      BETA                               1500.       PSF                           DATA      623     A
*   THE RADAR EVENT AND RADAR DATASETS **                                BOX PAGE  DATA      624     A
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RADAR EVENT                                                      BEG SET   DATA     625   A
        KTYPE                         4.0      INT                         DATA     626   A
        TIME                          99999    SEC                         DATA     627   A
RADAR B                                                          REFER     DATA     628   A
OBJECT-1                                                         REFER     DATA     629   A
        KTRACK                        1.0                        ZEROS     DATA     630   A
        KFLAG                         INITIAL                              DATA     631   A
        SPACE                         2.0                        ZEROS     DATA     632   A
SYSTEM OUTPUT DATASET                                            REFER     DATA     633   A
        SPACE                         6.0                        ZEROS     DATA     634   A
*       RADAR DATA                                               BOX       DATA     635   A
RADAR LIST                                                       BEG LIST  DATA     636   A
RADAR B                                                          REFER     DATA     637   A
RADAR B                                                          BEG SET   DATA     638   A
         NAME                         RAD/B                                DATA     639   A
PLATFORM FOR RADAR                                               REFER     DATA     640   A
BORESIGHT FOR RADAR B                                            REFER     DATA     641   A
RADAR TYPE DATA                                                  REFER     DATA     642   A
RADAR ERRORS                                                     REFER     DATA     643   A
DISCRIMINATION INPUT DATASET                                     REFER     DATA     644   A
SPACE FOR TRACK FILE LIST HERE        1.0                        ZEROS     DATA     645   A
GEOGRAPHICAL CENTER FOR LOCAL COORDINATE SYSTEM                  BEG SET   DATA     646   A
COORD CENTER                          0.       -79.33    47.75   GEOGR     DATA     647   A
* BORESIGHT ARRAY FOR PRECEDING RADAR ---------------------------  PRINT     DATA     648   A
BORESIGHT FOR RADAR B                                            BEG SET   DATA     649   A
         MAY FACE 1 ACQUIRE           YES                                  DATA     650   A
        BORESIGHT                     1.0E-3   90.       25.     POLAR     DATA     651   A
BORESIGHT FOR RADAR B                                            END SET   DATA     652   A
*  RADAR ERROR LIST                                              BOX       DATA     653   A
RADAR ERRORS                                                     BEG SET   DATA     654   A
        FIXED ERRORS, R               500.     FT                          DATA     655   A
        FIXED ERRORS, A               .5       MRAD                        DATA     656   A
        FIXED ERRORS, E               .8       MRAD                        DATA     657   A
        S/N DEP. ERRORS, R            2400.    FT                          DATA     658   A
        S/N DEP. ERRORS, A            15.      MRAD                        DATA     659   A
        S/N DEP. ERRORS, E            15.      MRAD                        DATA     660   A
         (SPACE FOR BIAS VALUES)      3.0                        ZEROS     DATA     661   A
*  DISCRIMINATION TYPE DATA                                      BOX       DATA     662   A
DISCRIMINATION INPUT DATASET                                     BEG SET   DATA     663   A
         DISCRIMINANT                 FFL                                  DATA     664   A
         MAX FREQUENCY                575.0    MHZ                         DATA     665   A
         MIN FREQUENCY                450.0    MHZ                         DATA     666   A
         LENGTH                       6.       FT                          DATA     667   A
         TIME INTERVAL                1.0      SEC                         DATA     668   A
         MFF                          100.     KM                          DATA     669   A
TOTAL DISCRIMINATION TIME             10.      SEC                         DATA     670   A
RANGE LIMIT FOR DISCRIMINATION        100.     KM                          DATA     671   A
         NOISE BANDWIDTH              100.0    MHZ                         DATA     672   A
        SPACE FOR STATE VECTOR        10.                        ZEROS     DATA     673   A
*  RADAR TYPE DATA                                               BOX       DATA     674   A
RADAR TYPE DATA                                                  BEG SET   DATA     675   A
NAME                                  MOLEST                               DATA     676   A
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FLAG FOR BEAM STACKING                 NONSTACKED                                      DATA      677    A
RADAR ERRORS                                                                REFER      DATA      678    A
TRANSMIT BEAM SHAPE MODEL                                                   REFER      DATA      679    A
RECEIVE BEAM SHAPE MODEL                                                    REFER      DATA      680    A
SEARCH MODE PARAMETERS DATASET                                              REFER      DATA      681    A
TRACK MODE PARAMETERS DATASET                                               REFER      DATA      682    A
         FREQUENCY                     450.       MHZ                                  DATA      683    A
          SYSTEM TEMPERATURE           720.0                                           DATA      684    A
         HORIZON LIMIT                 2.         DEG                                  DATA      685    A
          OFF BORESIGHT LIMIT          60.        DEG                                  DATA      686    A
ANTENNA POLARIZATION                   NONLINEAR                                       DATA      687    A
*                                                                           PRINT      DATA      688    A
*                                                                           PRINT      DATA      689    A
SEARCH MODE PARAMETERS DATASET                                              BEG SET    DATA      690    A
         RANGE ON 1SQ-M                2500.      NMSQM                                DATA      691    A
         THRESHOLD DET+VERIF           20.        DB                                   DATA      692    A
          DELAY FROM ACQ TO TRACK      .1         SEC                                  DATA      693    A
          FRAME RANDOMIZATION          NONRANDOM                                       DATA      694    A
         MAX DET ALT                   1800.      NM                                   DATA      695    A
         MIN DET ALT                   1.         KM                                   DATA      696    A
         MAX DET RANGE                 1800.      NM                                   DATA      697    A
         MIN DET RANGE                 1.         KM                                   DATA      698    A
         FRAME TIME                    1.0        SEC                                  DATA      699    A
         VERIFY PULSE                  1.0        SEC                                  DATA      700    A
         MIN ELEV                      2.         DEG                                  DATA      701    A
          UPPER ELEVATION              85.        DEG                                  DATA      702    A
          SIDE HALF AZIMUTH            55.        DEG                                  DATA      703    A
         NOISE BANDWIDTH               2.5        KHZ                                  DATA      704    A
         SIGNAL BANDWIDTH              2.5        KHZ                                  DATA      705    A
         PULSE COMPRESSION             1.0                                             DATA      706    A
          RANGE SIDELOBE LEVEL         -30.       DB                                   DATA      707    A
         SEARCH FLAG                   1.0        INT                                  DATA      708    A
REFERECNCE FOR RADAR                                                        BEG SET    DATA      709    A
COORD CENTER                           0.         -79.33     47.75          GEOGR      DATA      710    A
PLATFORM FOR RADAR                                                          BEG SET    DATA      711    A
TYPE                                   FIXED                                           DATA      712    A
         RADAR LOCATION                0.         0.         0.             LOCXYZ     DATA      713    A
*                                                                           PRINT      DATA      714    A
AD HOC DATA SET FOR TRACKER INITIALIZATION                                  BEG SET    DATA      715    A
          BETA MULTIPLIER              0.0                                             DATA      716    A
          DECAY TIMES      TAU1        99999.                                          DATA      717    A
                           TAU2        99999.                                          DATA      718    A
                           H TAU       0.0                                             DATA      719    A
          BETA MULTIPLIER SIGMA START  500.0                                           DATA      720    A
          BETA DOT                     30.0                                            DATA      721    A
GUESSED BETA TABLE                                                          REFER      DATA      722    A
GUESSED BETA TABLE                                                          BEG SET    DATA      723    A
TYPE                                   2.0        INT                                  DATA      724    A
NUMBER OF TABULAR ENTRIES              2.0        INT                                  DATA      725    A
N-POINT INTERPOLATION FOR N=           2.0        INT                                  DATA      726    A
TABULAR VALUES FOLLOW          10.0    KM         1500.0     PSF            TABLE      DATA      727    A
                               50.0    KM         1500.0     PSF            TABLE      DATA      728    A
```

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*
TRANSMIT BEAM SHAPE MODEL
NAME                                    CONSTANT
SHAPE                                   CIRCULAR
        BEAMWIDTH                       1.5         DEG
        HALF BEAM SINE SPACE            0.
ELLIPTICAL HALF V VALUE                 0.0
        NEAR-IN ANGULAR SIDELOBE LEVEL  -30.        DB
        INTERNAL STORAGE                1.0
*
TRACK MODE PARAMETERS DATASET
        S/N THRESHOLD                   15.         DB
        MIN TRACK RANGE                 1.          KM
        RANGE GATE PARM, K1             .5          KM
                         K2             2.0
         TOTAL TIME BEFORE DROP TRACK   10.         SEC
        TRACK INT                       1.          SEC
        RANGE ON 1 SQ-M                 2500.       NMSQM
        RANGE GATE                      1.          KM
        NOISE BANDWIDTH                 2.5         KHZ
        SIGNAL BANDWIDTH                .3          MHZ
        PULSE COMPRESSION               120.
RANGE SIDELOBE LEVEL                    -30.        DB
RADAR CROSS SECTION DATASET
        MODEL TYPE                      1.0         INT
        RCS                             1.0         MSQ
BODY AXIS ALONG VELOCITY TUMBLING MODEL
MODEL TYPE                              1.0         INT
RECEIVE BEAM SHAPE MODEL
TRANSMIT BEAM SHAPE MODEL
RECEIVE BEAM SHAPE MODEL
*   THE COMMUNICATIONS EVENT DATASETS --
COMMUNICATIONS EVENT DATASET
        EVENT TYPE                      22.         INT
        EVENT TIME                      99999.      SEC
        TRANSMITTER PLATFORM DATASET
        SATELLITE PLATFORM DATASET
        RECEIVER PLATFORM DATASET
        TIME STEP                       30.         SEC
        TYPE MOD.                       DPSK
        REGEN.                          YES
        COHERENT FSK                    NO
        FULLY DET.                      YES
        CONSTANT ZETA                   .707
        ORDER PLL                       FIRST
        UPLINK DATASET
        DOWNLINK DATASET
SPACE FOR INTERNAL CALCULATIONS         6.0
INITIAL VALUE FOR T1                    -10.        SEC
INITIAL VALUE FOR T2                    -10.        SEC
SPACE FOR INTERNAL CALCULATIONS         9.
*       UPLINK,DOWNLINK DATA
```

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PRINT       DATA        729     A
BEG SET     DATA        730     A
            DATA        731     A
            DATA        732     A
            DATA        733     A
            DATA        734     A
            DATA        735     A
            DATA        736     A
ZEROS       DATA        737     A
PRINT       DATA        738     A
BEG SET     DATA        739     A
            DATA        740     A
            DATA        741     A
            DATA        742     A
            DATA        743     A
            DATA        744     A
            DATA        745     A
            DATA        746     A
            DATA        747     A
            DATA        748     A
            DATA        749     A
            DATA        750     A
            DATA        751     A
BEG SET     DATA        752     A
            DATA        753     A
            DATA        754     A
BEG SET     DATA        755     A
            DATA        756     A
BEG SET     DATA        757     A
INSERT      DATA        758     A
END SET     DATA        759     A
BOX PAGE    DATA        760     A
BEG SET     DATA        761     A
            DATA        762     A
            DATA        763     A
REFER       DATA        764     A
REFER       DATA        765     A
REFER       DATA        766     A
            DATA        767     A
            DATA        768     A
            DATA        769     A
            DATA        770     A
            DATA        771     A
            DATA        772     A
            DATA        773     A
REFER       DATA        774     A
REFER       DATA        775     A
ZEROS       DATA        776     A
            DATA        777     A
            DATA        778     A
ZEROS       DATA        779     A
BOX         DATA        780     A
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          UPLINK DATASET                        BEG SET   DATA   781   A
          POWER                     100.    WATTS             DATA   782   A
          FREQ                      8000.   MHZ               DATA   783   A
          TRANS. GAIN               61.     DB                DATA   784   A
          REC. GAIN                 16.8    DB                DATA   785   A
TRANSMITTER LOSS FACTOR             2.5     DB                DATA   786   A
SYSTEM LINE LOSS FACTOR             0.5     DB                DATA   787   A
          PHASED ARRAY TRANSMITTER  NO                        DATA   788   A
          UPLINK XMTR AZIM ERROR    0.      DEG               DATA   789   A
          UPLINK XMTR ELEV ERROR    0.      DEG               DATA   790   A
SPACE FOR BORESIGHT VECTOR          3.                ZEROS   DATA   791   A
          PHASED ARRAY RECEIVER     NO                        DATA   792   A
          UPLINK RCVR AZIM ERROR    0.      DEG               DATA   793   A
          UPLINK RCVR ELEV ERROR    0.      DEG               DATA   794   A
SPACE FOR BORESIGHT VECTOR          3.                ZEROS   DATA   795   A
          BIT PERIOD                1.0E-8  SEC               DATA   796   A
          IF BANDWIDTH              125.    MHZ               DATA   797   A
          BANDWIDTH FOR PLL         125.    MHZ               DATA   798   A
          BEAMWIDTH                 1.5     DEG               DATA   799   A
          S/N THRESHOLD             15.     DB                DATA   800   A
SIDELOBE LEVEL                      30.     DB                DATA   801   A
          SPACE FOR BIT ERROR,PHASE ERROR2.0          ZEROS   DATA   802   A
          RECEIVER NOISE TEMPERATURE 720.                     DATA   803   A
          SPACE FOR NOISE FIGURE,TEMP 2.0             ZEROS   DATA   804   A
SPACES FOR INTERNAL CALCULATIONS    32.               ZEROS   DATA   805   A
          DOWNLINK DATASET                            BEG SET DATA   806   A
          POWER                     20.     WATTS             DATA   807   A
          FREQ                      7400.   MHZ               DATA   808   A
          TRANS. GAIN               33.2    DB                DATA   809   A
          REC. GAIN                 61.     DB                DATA   810   A
TRANSMITTER LOSS FACTOR             3.2     DB                DATA   811   A
SYSTEM LOSS FACTOR                  0.5     DB                DATA   812   A
          PHASE ARRAY TRANSMITTER   NO                        DATA   813   A
          DNLINK XMTR AZIM ERROR    0.      DEG               DATA   814   A
          DNLINK XMTR ELEV ERROR    0.      DEG               DATA   815   A
SPACE FOR BORESIGHT VECTOR          3.                ZEROS   DATA   816   A
          PHASED ARRAY RECEIVER     NO                        DATA   817   A
          DNLINK RCVR AZIM ERROR    0.      DEG               DATA   818   A
          DNLINK RCVR ELEV ERROR    0.      DEG               DATA   819   A
SPACE FOR BORESIGHT VECTOR          3.                ZEROS   DATA   820   A
          BIT PERIOD                1.0E-8  SEC               DATA   821   A
          IF BANDWIDTH              125.    MHZ               DATA   822   A
          BANDWIDTH PLL             125.    MHZ               DATA   823   A
          BEAMWIDTH                 1.5     DEG               DATA   824   A
          S/N THRESHOLD             15.     DB                DATA   825   A
SIDELOBE LEVEL                      30.     DB                DATA   826   A
          SPACE FOR BIT ERROR,PHASE ERROR2.0          ZEROS   DATA   827   A
RECEIVER NOISE TEMPERATURE          200.                      DATA   828   A
          SPACE FOR NOISE FIGURE,TEMP 2.0             ZEROS   DATA   829   A
SPACES FOR INTERNAL CALCULATIONS    32.               ZEROS   DATA   830   A
*         GROUND XMITTER,GROUND RECEIVER, AND SATELLITE POSITIONS  BOX  DATA  831  A
REF. POS. FOR COMMUNICATIONS                          BEG SET DATA   832   A
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REFERENCE POSITION                        0.        -79.33    47.75     GEUGR     DATA      833    A
        TRANSMITTER PLATFORM DATASET                                    BEG SET   DATA      834    A
        TYPE OF PLATFORM                  FIXED                                   DATA      835    A
        TRANS. POSITION                   0.        0.        0.        LOCXYZ    DATA      836    A
        RECEIVER PLATFORM DATASET                                       BEG SET   DATA      837    A
        TYPE                              FIXED                                   DATA      838    A
        REC. POSITION                     0.        0.        0.        LOCXYZ    DATA      839    A
        SATELLITE PLATFORM DATASET                                      BEG SET   DATA      840    A
        TYPE                              FIXED                                   DATA      841    A
        SAT. POSITION                     0.        0.        35787.    LOCXYZ    DATA      842    A
*   THE OPTICAL SENSOR EVENT AND OPTICS DATA **                         BOX PAGE  DATA      843    A
OPTICS LOCK EVENT                                                       BEG SET   DATA      844    A
        TYPE                              25.       INT                           DATA      845    A
        TIME                              99999.    SEC                           DATA      846    A
OPTICAL SENSOR                                                          REFER     DATA      847    A
REF-OBJECT                                                              REFER     DATA      848    A
SPACE                                     1.0                           ZEROS     DATA      849    A
        KFLAG                             SET-UP                                  DATA      850    A
SPACE                                     1.0                           ZEROS     DATA      851    A
*       CLOUD DATA                                                      BOX       DATA      852    A
BASIC CLOUD DATASET                                                     BEG SET   DATA      853    A
        MODEL TYPE                        1.        INT                           DATA      854    A
        NUMBER OF CLOUDS                  1.        INT                           DATA      855    A
CLOUD LIST                                1.                            ZEROS     DATA      856    A
STATISTICAL CLOUD DATASET                                               REFER     DATA      857    A
STATISTICAL CLOUD DATASET                                               BEG SET   DATA      858    A
        MODEL NUMBER                      1.        INT                           DATA      859    A
        LAYER PARAMETER                   0.        INT                           DATA      860    A
        SPACES                            90.                           ZEROS     DATA      861    A
CLOUD LIST                                                              BEG LIST  DATA      862    A
CLOUD A                                                                 REFER     DATA      863    A
CLOUD A                                                                 BEG SET   DATA      864    A
        OBJECT TYPE                       CLOUD                                   DATA      865    A
        CLOUD INDEX                       1.0       INT                           DATA      866    A
        CLOUD TYPE                        1.0       INT                           DATA      867    A
        POSITION                          6.        82.75     51.32     GEOGR     DATA      868    A
        SEMI-MAJOR HORIZ. AXIS (A)        4.        KM                            DATA      869    A
        SEMI-MINOR HORIZ. AXIS (B)        4.        KM                            DATA      870    A
        SEMI-MAJOR VERT. AXIS (C)         4.        KM                            DATA      871    A
        ORIENTATION (A +CCW FROM EAST)    0.        DEG                           DATA      872    A
*       OPTICAL SENSOR DATA                                             BOX       DATA      873    A
OPTICAL SENSOR LIST                                                     BEG LIST  DATA      874    A
OPTICAL SENSOR                                                          REFER     DATA      875    A
OPTICAL SENSOR                                                          BEG SET   DATA      876    A
        NAME                              SCOPE                                   DATA      877    A
        OPTICS TYPE                       TRACK                                   DATA      878    A
        OPTICS CALC TYPE                  FOV                                     DATA      879    A
        OBJECT TYPES                      ALL                                     DATA      880    A
BORESIGHT                                                               REFER     DATA      881    A
PLATFORM                                                                REFER     DATA      882    A
OPTICS TYPE                                                             REFER     DATA      883    A
OPTICS NOISE                                                            REFER     DATA      884    A
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```
OPTICS OPTIONS                          1.0
TRACK FILE                              1.0
OPTICS GRID
LIST OF PATHS                           1.0
OPTICS NOISE
        FIXED ERRORS, AZM               .01         MRAD
        FIXED ERRORS, ELV               .01         MRAD
        S/N DEP. ERRORS, AZM            1.          MRAD
        S/N DEP. ERRORS, ELV            1.          MRAD
SPACE FOR BIAS ERRORS                   2.0
BORESIGHT
ACQUISITION ALLOWED                     YES
        BORESIGHT                       3.0
        SIGMA                           0.
DUMMY REF. POS. FOR OPTICS SENSOR
REF. POS. FOR OPTICS SENSOR             35787       -79.33      47.75
PLATFORM
        TYPE                            FIXED
        SENSOR POSITON                  35787       -79.33      47.75
*       OPTICS TYPE DATA
OPTICS TYPE
        NAME                            STANDARD
        NUMBER OF DETECTORS             1.          INT
        DIAMETER                        2.7E-5
        BLUR DIAMETER                   2.7E-5
        NEFD                            .5E-16
        NEFD BAND WIDTH                 6000.
        SPACE                           1.0
        FRAME TIME                      10.         SEC
        RANDOM                          NO
        MIN UPDATE TIME                 10.         SEC
        MAX UPDATE TIME                 10.         SEC
WAVELENGTH BAND LIST
FIELD-OF-VIEW
WAVELENGTH BAND LIST
WAVELENGTH BAND A
WAVELENGTH BAND A
        LOW END                         2.5E-6      M
        HIGH END                        2.6E-6      M
        SPACES                          3.0
WAVELENGTH BAND B
        LOW END                         2.6E-6      M
        HIGH END                        2.7E-6      M
        SPACES                          3.0
FIELD-OF-VIEW
        TYPE                            SQUARE
        AZIMUTH EXTENT                  .8E-3
        ELEVATION EXTENT                .8E-3
        HBAF                            60.         KM
        ABAF                            -999.
*       OPTICS CALCULATIONS
OPTICS OPTIONS
```

```
ZEROS       DATA    865     A
ZEROS       DATA    866     A
REFER       DATA    887     A
ZEROS       DATA    888     A
BEG SET     DATA    889     A
            DATA    890     A
            DATA    891     A
            DATA    892     A
            DATA    893     A
ZEROS       DATA    894     A
BEG SET     DATA    895     A
            DATA    896     A
ZEROS       DATA    897     A
            DATA    898     A
BEG SET     DATA    899     A
GEOGR       DATA    900     A
BEG SET     DATA    901     A
            DATA    902     A
GEOGR       DATA    903     A
BOX         DATA    904     A
BEG SET     DATA    905     A
            DATA    906     A
            DATA    907     A
            DATA    908     A
            DATA    909     A
            DATA    910     A
            DATA    911     A
ZEROS       DATA    912     A
            DATA    913     A
            DATA    914     A
            DATA    915     A
            DATA    916     A
REFER       DATA    917     A
REFER       DATA    918     A
BEG LIST    DATA    919     A
REFER       DATA    920     A
BEG SET     DATA    921     A
            DATA    922     A
            DATA    923     A
ZEROS       DATA    924     A
BEG SET     DATA    925     A
            DATA    926     A
            DATA    927     A
ZEROS       DATA    928     A
BEG SET     DATA    929     A
            DATA    930     A
            DATA    931     A
            DATA    932     A
            DATA    933     A
            DATA    934     A
BOX         DATA    935     A
BEG SET     DATA    936     A
```

```
SIMULATE OPTICS
TRACK SIMULATION EVENT                  1.0
SPACES                                  3.0
SIMULATE OPTICS
        KTYPE                           27.         INT
        TIME                            99999.      SEC
        MODEL TYPE                      SURVEIL-01
        SCAN TYPE                       CIRCULAR
OPTICAL SENSOR
        PLOTS                           OBJECTS
        SPACE FOR IFP DATA              1.0
        SPIRE LIST                      1.0
        SPACE FOR MEASUREMENT DATA      1.0
SPACE FOR LIST HEADER                   1.0
OPTICS GRID
        IFLAG                           0.          INT
        DELTA AZIMUTH                   .4E-3
        DELTA ELEVATION                 .4E-3
OPTICAL TRACK SIMULATION
        KTYPE                           28.         INT
        OPTICAL TRACK TIME              99999.      SEC
SPACE FOR SENSOR,OBJECT,TRACK FILE      3.0
        TRACK INT                       1.          SEC
BORESIGHT
        CAN THE SENSOR ACQUIRE          YES
        INITAL RANGE ERROR              1.0         KM
*       SPIRE SENSOR PROCESSING BLOCKS
SPIRE COMPUTATION LIST
BLOCK 2
BLOCK 3
BLOCK 4
BLOCK 5
BLOCK 6
BLOCK 7
BLOCK 2
        BLOCK TYPE (SCAN)               4.
        FIRST BRANCH                    1.
        BRANCH INTERVAL                 1.
        PERIOD                          1.27E-3
        SCAN LENGTH                     .8E-3
BLOCK 3
        BLOCK TYPE (DETECTOR NOISE)     5.
        BRANCH                          1.
BLOCK 4
        BLOCK TYPE (GAUSSMO)            6.
        BRANCH                          1.
        BANDPASS                        15000.
        4 SIGMA                         0.
BLOCK 5
        BLOCK TYPE (GAIN)               19.
        BRANCH                          1.
        GAIN                            1.
```

```
REFER       DATA        937     A
ZEROS       DATA        938     A
ZEROS       DATA        939     A
BEG SET     DATA        940     A
            DATA        941     A
            DATA        942     A
            DATA        943     A
            DATA        944     A
REFER       DATA        945     A
            DATA        946     A
ZEROS       DATA        947     A
ZEROS       DATA        948     A
ZEROS       DATA        949     A
ZEROS       DATA        950     A
BEG SET     DATA        951     A
            DATA        952     A
            DATA        953     A
            DATA        954     A
BEG SET     DATA        955     A
            DATA        956     A
            DATA        957     A
ZEROS       DATA        958     A
            DATA        959     A
REFER       DATA        960     A
            DATA        961     A
            DATA        962     A
BOX         DATA        963     A
BEG LIST    DATA        964     A
REFER       DATA        965     A
REFER       DATA        966     A
REFER       DATA        967     A
REFER       DATA        968     A
REFER       DATA        969     A
REFER       DATA        970     A
BEG SET     DATA        971     A
            DATA        972     A
            DATA        973     A
            DATA        974     A
            DATA        975     A
            DATA        976     A
BEG SET     DATA        977     A
            DATA        978     A
            DATA        979     A
BEG SET     DATA        980     A
            DATA        981     A
            DATA        982     A
            DATA        983     A
            DATA        984     A
BEG SET     DATA        985     A
            DATA        986     A
            DATA        987     A
            DATA        988     A
```

```
BLOCK 6                                                              BEG SET   DATA    989   A
         BLOCK TYPE (GAIN)            17.                                      DATA    990   A
         BRANCH                       1.                                       DATA    991   A
         GAIN                         1.                                       DATA    992   A
BLOCK 7                                                              BEG SET   DATA    993   A
         BLOCK TYPE                   26.                                      DATA    994   A
         BRANCH                       1.                                       DATA    995   A
         X-POSITION AT SCAN START     -.4E-3                                   DATA    996   A
         Y-POSITION AT SCAN START     0.                                       DATA    997   A
         THRESHOLD                    100.                                     DATA    998   A
*  BURST DATA                                                        BOX PAGE  DATA    999   A
BURST COORDINATE CENTER                                              BEG SET   DATA   1000   A
COORD CENTER                          0.        -79.33    47.75      GEOGR     DATA   1001   A
BURST EVENT DATASET-1                                                BEG SET   DATA   1002   A
          EVENT TYPE                  8.        INT                            DATA   1003   A
         TIME                         99999.    SEC                            DATA   1004   A
         POSITION                     0.        0.        200.       LOCXYZ    DATA   1005   A
BOMB-1                                                               REFER     DATA   1006   A
BURST EVENT DATASET-1                                                END SET   DATA   1007   A
BURST EVENT DATASET-2                                                BEG SET   DATA   1008   A
          EVENT TYPE                  8.0       INT                            DATA   1009   A
         TIME                         99999.    SEC                            DATA   1010   A
         POSITION                     0.        0.        200.       LOCXYZ    DATA   1011   A
BOMB-2                                                               REFER     DATA   1012   A
BURST EVENT DATASET-2                                                END SET   DATA   1013   A
BURST EVENT DATASET-3                                                BEG SET   DATA   1014   A
          EVENT TYPE                  8.0       INT                            DATA   1015   A
         TIME                         99999.    SEC                            DATA   1016   A
         POSITION                     0.        0.        200.       LOCXYZ    DATA   1017   A
BOMB-3                                                               REFER     DATA   1018   A
BURST EVENT DATASET-3                                                END SET   DATA   1019   A
BURST EVENT DATASET-4                                                BEG SET   DATA   1020   A
         TYPE                         8.        INT                            DATA   1021   A
         TIME                         99999.    SEC                            DATA   1022   A
         POSITION                     0.        0.        200.       LOCXYZ    DATA   1023   A
BOMB-4                                                               REFER     DATA   1024   A
BURST EVENT DATASET-5                                                BEG SET   DATA   1025   A
         TYPE                         8.        INT                            DATA   1026   A
         TIME                         99999.    SEC                            DATA   1027   A
         POSITION                     0.        0.        200.       LOCXYZ    DATA   1028   A
BOMB-5                                                               REFER     DATA   1029   A
*  WEAPON TYPE DATA                                                  BOX       DATA   1030   A
*                                                                    PRINT     DATA   1031   A
BOMB-1                                                               BEG SET   DATA   1032   A
         NAME                         BOMB-1                                   DATA   1033   A
         YIELD                        1.0       MT                             DATA   1034   A
         FFRAC                        .50                                      DATA   1035   A
         HFRAC                        .24                                      DATA   1036   A
         NFRAC                        .01                                      DATA   1037   A
         XFRAC                        .75                                      DATA   1038   A
         THRML NFRAC                  .50                                      DATA   1039   A
         GFRAC                        .001                                     DATA   1040   A
```

```
        WMASS                          1.5E6     GM
        FRACTION ALUMINUM              0.05
        SPACES                         2.0
        FRACTION URANIUM               0.45
DEVICE DEPENDENT ENERGY SPECTRUM DATA =1
SPACE FOR ENERGY SPECTRUM DATA         1.0
BOMB=2
        NAME                           BOMB=2
        YIELD                          1.0       MT
        FFRAC                          .10
        HFRAC                          .24
        NFRAC                          .01
        XFRAC                          .75
        THRML NFRAC                    .50
        GFRAC                          .001
        WMASS                          1.5E6     GM
        FRACTION ALUMINUM              0.05
        SPACES                         2.0
        FRACTION URANIUM               0.45
DEVICE DEPENDENT ENERGY SPECTRUM DATA =2
SPACE FOR ENERGY SPECTRUM DATA         1.0
BOMB=3
        NAME                           BOMB=3
        YIELD                          1.0       MT
        FFRAC                          .10
        HFRAC                          .24
        NFRAC                          .01
        XFRAC                          .75
        THRML NFRAC                    .50
        GFRAC                          .001
        WMASS                          1.5E6     GM
        FRACTION ALUMINUM              0.05
        SPACES                         2.0
        FRACTION URANIUM               0.45
DEVICE DEPENDENT ENERGY SPECTRUM DATA =3
SPACE FOR ENERGY SPECTRUM DATA         1.0
BOMB=4
        NAME                           BOMB=4
        YIELD                          1.0       MT
        FFRAC                          .10
        HFRAC                          .24
        NFRAC                          .01
        XFRAC                          .75
        THRML NFRAC                    .50
        GFRAC                          .001
        WMASS                          1.5E6     GM
        FRACTION ALUMINUM              0.05
        SPACES                         2.0
        FRACTION URANIUM               0.45
DEVICE DEPENDENT ENERGY SPECTRUM DATA =4
SPACE FOR ENERGY SPECTRUM DATA         1.0
BOMB=5
```

```
                DATA    1041    A
                DATA    1042    A
ZEROS           DATA    1043    A
                DATA    1044    A
REFER           DATA    1045    A
ZEROS           DATA    1046    A
BEG SET         DATA    1047    A
                DATA    1048    A
                DATA    1049    A
                DATA    1050    A
                DATA    1051    A
                DATA    1052    A
                DATA    1053    A
                DATA    1054    A
                DATA    1055    A
                DATA    1056    A
                DATA    1057    A
ZEROS           DATA    1058    A
                DATA    1059    A
REFER           DATA    1060    A
ZEROS           DATA    1061    A
BEG SET         DATA    1062    A
                DATA    1063    A
                DATA    1064    A
                DATA    1065    A
                DATA    1066    A
                DATA    1067    A
                DATA    1068    A
                DATA    1069    A
                DATA    1070    A
                DATA    1071    A
                DATA    1072    A
ZEROS           DATA    1073    A
                DATA    1074    A
REFER           DATA    1075    A
ZEROS           DATA    1076    A
BEG SET         DATA    1077    A
                DATA    1078    A
                DATA    1079    A
                DATA    1080    A
                DATA    1081    A
                DATA    1082    A
                DATA    1083    A
                DATA    1084    A
                DATA    1085    A
                DATA    1086    A
                DATA    1087    A
ZEROS           DATA    1088    A
                DATA    1089    A
REFER           DATA    1090    A
ZEROS           DATA    1091    A
BEG SET         DATA    1092    A
```

```
      NAME                                  BOMB-5                                  DATA   1093   A
      YIELD                                 1.0      MT                             DATA   1094   A
      FFRAC                                 .10                                     DATA   1095   A
      HFRAC                                 .24                                     DATA   1096   A
      NFRAC                                 .01                                     DATA   1097   A
      XFRAC                                 .75                                     DATA   1098   A
      THRML NFRAC                           .50                                     DATA   1099   A
      GFRAC                                 .001                                    DATA   1100   A
      WMASS                                 1.5E6    GM                             DATA   1101   A
      FRACTION ALUMINUM                     0.05                                    DATA   1102   A
      SPACES                                2.0                      ZEROS          DATA   1103   A
      FRACTION URANIUM                      0.45                                    DATA   1104   A
DEVICE DEPENDENT ENERGY SPECTRUM DATA -5                             REFER          DATA   1105   A
SPACE FOR ENERGY SPECTRUM DATA              1.0                      ZEROS          DATA   1106   A
DEVICE DEPENDENT ENERGY SPECTRUM DATA -1                             BEG SET        DATA   1107   A
FLAG FOR INITIALIZATION                     START                                   DATA   1108   A
NEUTRON WEAPON DEPENDENT DATA                                        REFER          DATA   1109   A
GAMMA WEAPON DEPENDENT DATA                                          REFER          DATA   1110   A
X-RAY WEAPON DEPENDENT DATASET1.0                                    REFER          DATA   1111   A
     SPACE FOR X-DATA                       1.0                      ZEROS          DATA   1112   A
     SPACE FOR N-DATA                       1.0                      ZEROS          DATA   1113   A
     SPACE FOR G-DATA                       1.0                      ZEROS          DATA   1114   A
DEVICE DEPENDENT ENERGY SPECTRUM DATA -2                             BEG SET        DATA   1115   A
      FLAG                                  START                                   DATA   1116   A
NEUTRON WEAPON DEPENDENT DATA                                        REFER          DATA   1117   A
GAMMA WEAPON DEPENDENT DATA                                          REFER          DATA   1118   A
X-RAY WEAPON DEPENDENT DATASET1.0                                    REFER          DATA   1119   A
      SPACES                                3.0                      ZEROS          DATA   1120   A
DEVICE DEPENDENT ENERGY SPECTRUM DATA -3                             BEG SET        DATA   1121   A
      FLAG                                  START                                   DATA   1122   A
NEUTRON WEAPON DEPENDENT DATA                                        REFER          DATA   1123   A
GAMMA WEAPON DEPENDENT DATA                                          REFER          DATA   1124   A
X-RAY WEAPON DEPENDENT DATASET1.0                                    REFER          DATA   1125   A
      SPACES                                3.0                      ZEROS          DATA   1126   A
DEVICE DEPENDENT ENERGY SPECTRUM DATA -4                             BEG SET        DATA   1127   A
      FLAG                                  START                                   DATA   1128   A
NEUTRON WEAPON DEPENDENT DATA                                        REFER          DATA   1129   A
GAMMA WEAPON DEPENDENT DATA                                          REFER          DATA   1130   A
X-RAY WEAPON DEPENDENT DATASET1.0                                    REFER          DATA   1131   A
      SPACES                                3.0                      ZEROS          DATA   1132   A
DEVICE DEPENDENT ENERGY SPECTRUM DATA -5                             BEG SET        DATA   1133   A
      FLAG                                  START                                   DATA   1134   A
NEUTRON WEAPON DEPENDENT DATA                                        REFER          DATA   1135   A
GAMMA WEAPON DEPENDENT DATA                                          REFER          DATA   1136   A
X-RAY WEAPON DEPENDENT DATASET1.0                                    REFER          DATA   1137   A
      SPACES                                3.0                      ZEROS          DATA   1138   A
*WEAPON DEPENDENT DATA FOR DEPOSITION CALCULATIONS                   BOX PAGE       DATA   1139   A
X-RAY WEAPON DEPENDENT DATASET0.5                                    BEG SET        DATA   1140   A
SPECX              3.0        18.0        (7(E9.3,2X))               FORMAT         DATA   1141   A
2.820E-03, 1.640E-02, 9.100E-02, 1.740E-01, 4.710E-01, 2.360E-01, 9.640E-03,        DATA   1142   A
2.960E-06                                                                           DATA   1143   A
                                                                                    DATA   1144   A
```

```
END DATA                                                                        DATA      1145     A
X-RAY WEAPON DEPENDENT DATASET1,0                                      BEG SET  DATA      1146     A
SPECX                3.0        18.0      (7(E9.3,2X))                 FORMAT   DATA      1147     A
3,810E-04, 2,440E-03, 1,640E-02, 4,170E-02, 2,230E-01, 4,710E-01, 2,360E-01,   DATA      1148     A
9,350E-03, 1,920E-04                                                            DATA      1149     A
                                                                                DATA      1150     A
END DATA                                                                        DATA      1151     A
X-RAY WEAPON DEPENDENT DATASET2,0                                      BEG SET  DATA      1152     A
SPECX                3.0        18.0      (7(E9.3,2X))                 FORMAT   DATA      1153     A
4,940E-05, 3,310E-04, 2,440E-03, 7,020E-03, 5,110E-02, 2,230E-01, 4,710E-01,   DATA      1154     A
1,910E-01, 4,510E-02, 8,110E-03, 1,240E-03, 1,710E-04                           DATA      1155     A
                                                                                DATA      1156     A
END DATA                                                                        DATA      1157     A
NEUTRON WEAPON DEPENDENT DATA                                          BEG SET  DATA      1158     A
SPECN                3.0        18.0      (8(E8.2,2X))                 FORMAT   DATA      1159     A
0.01E-02, 2.00E-03, 2,40E-02, 1,22E-01, 3,65E-01, 1,02E-01, 8,50E-02, 6,20E-02, DATA      1160     A
2.80E-02, 5.00E-03, 1.90E-02, 2.60E-02, 1.70E-02, 1.80E-02, 1.47E-02, 1.41E-02, DATA      1161     A
2,56E-02, 7,06E-02                                                              DATA      1162     A
END DATA                                                                        DATA      1163     A
GAMMA WEAPON DEPENDENT DATA                                            BEG SET  DATA      1164     A
SPECG                3.0        18.0      (8(E8.2,2X))                 FORMAT   DATA      1165     A
3,08E-02, 1,36E-02, 8,16E-02, 6,87E-02, 8,67E-02, 1,77E-01, 1,40E-01, 1.00E-01, DATA      1166     A
1,07E-01, 6,18E-02, 3,94E-02, 3,76E-02, 2,23E-02, 2,12E-02, 7,48E-03, 3.23E-03, DATA      1167     A
6,79E-04, 1,58E-04                                                              DATA      1168     A
END DATA                                                                        DATA      1169     A
SPECD                3.0        18.0      (8(E8.2,2X))                 FORMAT   DATA      1170     A
1.11E-03, 3.80E-03, 1,40E-02, 2,09E-02, 2,62E-02, 6,35E-02, 7,13E-02, 7,36E-02, DATA      1171     A
1,17E-01, 1,05E-01, 9,14E-02, 1,04E-01, 7,34E-02, 8,19E-02, 3,51E-02, 1,70E-02, DATA      1172     A
4,12E-02, 9,94E-04                                                              DATA      1173     A
END DATA                                                                        DATA      1174     A
*   THE ENVIRONMENT OUTPUT AND STOP EVENTS --                          BOX PAGE DATA      1175     A
ENVIRONMENT OUTPUT EVENT                                               BEG SET  DATA      1176     A
         TYPE OF EVENT                     11,0      INT                        DATA      1177     A
         OUTPUT TIME                       99999.    SEC                        DATA      1178     A
         TYPE                              NONE                                 DATA      1179     A
         NPTS                              1,0       INT                        DATA      1180     A
         OUTPUT TIME INT                   30.       SEC                        DATA      1181     A
         END PRINT TIME                    1731.     SEC                        DATA      1182     A
         FREQUENCY                         450.      MHZ                        DATA      1183     A
         EVENT INITIALIZATION FLAG         1,0       INT                        DATA      1184     A
GRID OUTPUT DATASET                                                    REFER    DATA      1185     A
SPACE FOR INTERNAL STORAGE                 1.0                         ZEROS    DATA      1186     A
GRID OUTPUT DATASET                                                    BEG SET  DATA      1187     A
         TYPE                              FIREBALL                             DATA      1188     A
         INDEX                             1.        INT                        DATA      1189     A
         PLOT PARALLEL TO                  Y-AXIS                               DATA      1190     A
         KIND OF OUTPUT DESIRED            ALL                                  DATA      1191     A
STOP EVENT                                                             BEG SET  DATA      1192     A
     TYPE OF EVENT                         10.       INT                        DATA      1193     A
         STOP TIME                         0.        SEC                        DATA      1194     A
```

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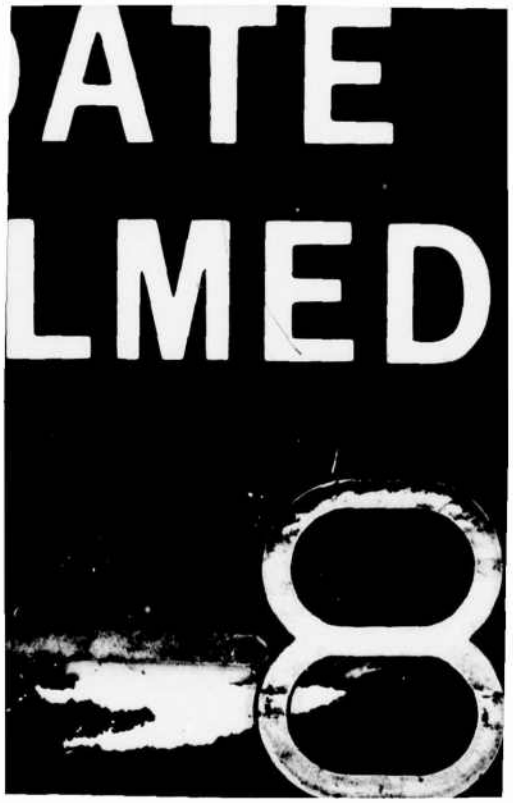
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